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XX. *The Musci and Hepaticæ of the Pyrenees.*

By Richard Spruce.

Read 11th January 1849.

Before entering upon an enumeration of the Musci and Hepaticæ of the Pyrenees, it will be proper to indicate the sources from which it has been derived. I have not been able to find any trustworthy record of mosses gathered in the Pyrenees previous to the time of Bridel, who in 1803 visited the Pyrénées Orientales and the northern part of Catalonia, where he discovered his *Bartramia stricta*, *Barbula chloronotos* and some others. Of Bridel's mosses I have seen only a very few, communicated by Professor Arnott from the herbarium of M. Requien. In the 3rd edition of the 'Flore Française' (1815) several Pyrenean stations of mosses are recorded, on the authority of DeCandolle, Ramond, Dufour and Grateloup. The two botanists last-named have since that period continued to pay occasional botanical visits to the Pyrenees, almost up to the present time, and to their liberality I owe specimens of such mosses as they collected. In 1825 the eastern and central Pyrenees were visited by our distinguished countrymen, Messrs. G. Bentham and G. A. Walker-Arnott, and the latter gentleman has kindly communicated to me specimens of nearly all his Pyrenean mosses, a few only of which he has noticed in "A Tour to the South of France and the Pyrenees," inserted in the 'Edinburgh New Philosophical Journal' for April 1826. Still later, from 1828 to 1830, the eastern Pyrenees were at various times partially explored by Dr. C. Montagne, whose knowledge of general Cryptogamy is unrivalled, and his discoveries, including numerous lichens and not a few mosses, were announced by himself in the 'Archives de Botanique,' tom. i. (1833), under the title of "Notice sur les Plantes Cryptogames récemment découvertes en France," &c. Most of these I have had the opportunity of examining. In 1835, Dr. Grateloup began to publish in the 'Actes de la Société Linnéenne de Bordeaux,' tom. vii., a "Cryptogamie Tarbellienne,

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ou Description succincte des Plantes cryptogames qui croissent aux environs de *Dax*, dans le Dépt. des *Landes*," in which were to be comprised all the Cryptogamia growing within 25 leagues of Dax, a district which would include the extreme Western Pyrenees; but it proceeded no farther than the publication of the Characeæ, Filices and Hepaticæ, for specimens of most of which I am under obligation to Dr. Grateloup. About the year 1843, MM. Philippe and de Lugo, two botanists residing at Bagnères-de-Bigorre, began to collect the mosses and Hepaticæ of the neighbouring mountains, and on the occasion of my visit to that city, two years afterwards, they put into my hands, without reserve, specimens of all they had succeeded in finding. A few mosses have also at different times been gathered in the Pyrenees by MM. des Moulins, Durieu, Gaston-Sacaze, and probably by others of whom I have not heard, and of whose labours I cannot therefore make that honourable mention which is their due. In 1845 came my own visit to the Pyrenees, undertaken principally (though not solely) for the purpose of studying the Musci and Hepaticæ, and extending through a period of nearly eleven months. It will not be without use if I here briefly retrace my steps, as some repetition will be thereby avoided, and an opportunity will be afforded of indicating the position of certain localities, the names of which are of frequent recurrence in my catalogue, though too obscure to be found in an ordinary map*.

I arrived at Pau, the *chef-lieu* of the Dept. of the *Basses-Pyrénées*, and the ancient capital of Béarn, in the early part of May 1845, and my first herborization in the Pyrenees was made on the 13th of the same month. My excursions comprised, besides the woods, &c. adjoining the town of Pau, the villages of Jurançon, Gélos, Rontignon and Narcastet, lying on the southern bank of the Gave de Pau, with the valleys running up from them to the southward, among what may be called the skirts of the Pyrenees; and the village of Bilhères, lying south of the same river. From the 29th to the 31st were devoted to a visit to Oloron, at the entrance of the Vallée d'Aspe, along which runs one of the most frequented roads into Spain. On the 11th of June I again left Pau for St. Sever, in the Landes, on a visit to Dr. Léon Dufour, the eminent naturalist, where eight days were usefully spent in exploring the neighbouring *landes*, especially those of Mugriet (Commune of Souprosse) a few miles distant from St. Sever, and on the opposite side of the Adour. Returning thence to Pau, I again started on the 25th for Laruns, a little town lying about 26 miles to the southward, near the up-

* For a fuller account of my tour consult the 'London Journal of Botany,' vol. v. p. 134.

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per extremity of the Vallée d'Ossau, and midway between the Eaux Bonnes and the Eaux Chaudes. Here commenced my acquaintance with the *real* Pyrenees. My excursions included the Pic de Ger and the Montagne Verte, the former overlooking the Eaux Bonnes from the south and the latter from the north; the Gorge de Hourat, conducting to the Eaux Chaudes, and watered by the Gave de Gabas; the Gave de Valentin, which uniting at Laruns with the Gave de Gabas, forms the Gave d'Ossau; the village of Béost and the hameau of Bagès (celebrated as the residence of Gaston-Sacaze, the shepherd-botanist). Descending the Vallée d'Ossau and again taking Pau in my way, I proceeded on the 8th of July to Argélez, in the Dept. of the *Hautes Pyrénées*. The following day was given to the herborization of Pierrefitte, on the south side of the valley (or rather *plain*) of Argélez, and at the confluence of the gorges of Luz and Cauterets. On the 11th I ascended to Cauterets, where I remained until the end of the month. My excursions from it were to the Pont d'Espagne and Lac de Gaube, ascending the Val de Jéret along the banks of the Gave de Marcadaou; to the valleys of Lutour and Combascou, and to Mont Lizé. On the 2nd of August, accompanied by Dr. Southby, a compatriot enthusiastic in the pursuit of natural history, I crossed the central chain by the Port de Cauterets to the baths of Penticosa in Aragon. In this excursion, which occupied four days, numerous interesting flowers, but scarcely any mosses, were added to my collection. Returning to Cauterets, and descending from thence to Argélez, on the 8th I again ascended to Luz, at the entrance of the valley of Barèges. From Luz I visited the celebrated Chaos and Cirque de Gavarnie, the Vallée d'Estaubé, &c., but my bryological collections were not much swelled thereby. On the 20th I crossed the Tourmalet to Bagnères-de-Bigorre, in the valley of the Adour. My stay was but short, for the present, and my only excursion of importance was to the flowery Mont Lhieris. The 27th and 28th of the same month were taken up in walking through the mountains, by way of the Hourquette d'Aspin, the Vallée d'Aure and the Port de Peyresourde, to Bagnères-de-Luchon, in the Dept. of the *Haute Garonne*. During my stay here of five weeks, I explored the whole of the magnificent Vallée du Lys (lateral to the valley of Luchon) with its four lakes and twenty-four cascades, and I ascended the lofty mountain of Crabioules (mountain of *crabes* or *izards*) which bounds it on the west, as far as the snow-line on the 1st and 2nd of October. Before this time I had visited the mountain of Superbagnères, which rises from the back of the town, the gorge of Esquierry ("le jardin des Pyrénées"); the Lacs d'Oo (Lac de Séculéjo and Lac d'Espingo) lying between

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Mont Crabioules and the Vallée d'Aure; the Vallée de Burbe (in which is the Bois de Gouerdère), and, passing through the Port de Portillon at its extremity, the upper part of the Vallée d'Aran in Catalonia; and on the 10th, 11th and 12th of September, passing through the Bois de Sajust and the Port de Bénasque (in the central chain), I had ascended the Maladetta in Aragon. Leaving Bagnères-de-Luchon and the Haute Garonne on the 4th of October, I returned to Bagnères-de-Bigorre, and occupied myself until nearly the end of the month in exploring its environs, by which my collection of pleurocarpous mosses was much enriched. The localities examined were the rocks of Bédat and Salut, close by the town; Mont Lhieris and the woods of Gerde and Asté at its base; the Gorge de Labassère; the Vallée de Lesponne with Lac Léhou (otherwise Lac Bleu), and a tributary valley (Ardalos) extending to the base of the terminal cone of the Pic du Midi. The autumn being unusually prolonged, and the summits still clear of snow, I undertook another expedition to the Basses Pyrénées, and on the 1st of November proceeded again to Laruns, where I remained until fairly driven away by the coming of winter. Besides the localities visited in summer from this station, I now examined the Vallée de Béost, which leads across the Col de Louvie to the Vallée d'Argélez; the upper part of the Gave de Valentin towards the Col de Tortes; the mountain (Goursi) which shades Laruns on the south; and Gabas, near the base of the Pic du Midi. Driven from the mountains, my next destination was, by way of Pau, to Dax (*Aquæ Augustæ Tarbellicæ*) in the Landes (*Ager Syrticus*), where I arrived on the 18th of November. In the midst of almost unceasing rain I visited in this rich district the ophitic rocks of St. Pandelon on the banks of the Luy (a tributary of the Adour), the chalk rocks of Tercis, and the woods of Saubagnac and La Torte. Having devoted a fortnight to a re-examination of the neighbourhood of Pau, I returned early in December to Bagnères to winter. In the Pyrenees, as throughout nearly all the rest of Europe, the winter of 1845–6 was remarkably mild, and by the month of February the lower mountains were quite clear of snow. I availed myself of this circumstance to explore the district almost completely, and in one instance to make, in company with M. Philippe, an excursion of four days (from the 5th to the 8th of February) into the heart of the mountains, for the purpose of examining the back of the Pic de Mont-Aigu and the Vallée de Castelloubon (otherwise V. de Gazos), which is separated by only a narrow ridge from the valleys of Luz and Argélez. Even at that season we were able to reach an altitude of 7000 feet, and might easily have gone higher, but the ground at that height,

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though almost clear of snow, was frozen to the depth of several inches, and the waterfalls were changed into sheets of ice. The chief localities examined near Bagnères, and not previously named, are the forests of Transoubât and of L'Escaladieu (the latter on the road to Toulouse); the valleys of Campan, Serris and Trébons; the Bois de Lagaillaste and the Camp de César, both near the village of Pouzac; the *Côtes schisteux* of Loucrup and the Bois de Montgaillard, on the road to Lourdes. These examinations enabled me to add extensively to the list of mosses previously observed by MM. Philippe and de Lugo. Finally quitting Bagnères early in March, a last visit to Pau rendered my collection of the mosses of the Western Pyrenees still more complete; and in proceeding thence to Paris, two days spent at St. Sever with the excellent Dufour, afforded me rarities unobserved the preceding year.

In this *résumé* of my wanderings I have avoided alluding to the species collected, but it will be seen, by tracing my track on the map, that I executed a network of journeys sufficient to explore pretty fully the tract of mountains traversed, extending from the Vallée d'Aspe on the west to the Vallée d'Aran on the east, and to enable me to state with considerable confidence the amount and distribution of species within these limits.

Since my return from the Pyrenees I have had a few additional species and habitats from my friend Philippe, and also from M. Schimper, who passed through part of the Pyrenees in 1847 on his way into Spain.

It must in conclusion be acknowledged, that it is only botanists resident in the Pyrenees who have it in their power to present to the world a complete flora, whether Phanerogamic or Cryptogamic, of these mountains. Botanical geography is a subject that can be but very imperfectly studied in the cabinet, and in sitting down to arrange the materials collected on a distant expedition, one always finds some deficiency, some essential observation omitted, which, to a person on the spot, might be supplied by travelling possibly only a few paces.

General considerations on the structure, &c. of the Pyrenees.—The Pyrenees may be aptly compared to an immense barrier, raised by nature's hand for the separation of two nations, and extending from sea to sea. The transversal ridges which spring here and there from the central chain may be considered as the buttresses, or as the outworks of this great fortification. The area occupied by these mountains lies between 3° 20′ E. and 2° 0′ W. long. (from Greenwich), and from a little north of the 43rd parallel nearly to the 42nd. Their direction, from the Mediterranean to the Bay of Biscay, is nearly W. by N.; and

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their length, from Cape Creux to the Port des Passages, is about 270 English miles. It is well known that the Pyrenees have at the latter limit reached but half their length, and that their continuation constitutes the elevated ridges of Bizcaya, Asturias and Gallicia, up to their real termination at Cape Finisterre; at present, however, we have only to do with that portion which separates France from Spain, and to which the name "Pyrenees" is popularly limited.

When attentively considered, the Pyrenees will be found to consist of *two* chains: the *western*, which increases in altitude from the ocean to the Maladetta (10,722 ft.*), its highest point, whence it rapidly sinks to the opposite sea; the *eastern* commencing north of the Maladetta, with hills of slight elevation, increases in height as it approaches the Mediterranean, not far from which is Mont Canigou (8652 ft.), one of its loftiest summits. From the point of dislocation is thrown off to the northward a remarkable embranchment, which separates the basin of the Garonne from that of the Adour, giving birth to the latter river, and stretches through the Dept. of the Hautes Pyrénées a little way into that of Gers: its highest point is the Pic du Midi de Bigorre (9000 ft.). Some geologists (as M. Reboul) have traced several distinct axes of elevation in the Pyrenees; and M. Elie de Beaumont supposes that they have been upheaved at four distinct epochs, though the great mass owes its elevation to only the third of these, which was posterior to the chalk formation. The fourth epoch of elevation is perceivable only in the localities where serpentine (*ophite*) appears.

The loftiest summits of the Pyrenees are nearly all out of the central chain; the Maladetta, the culminating point of the whole range, is to the southward of it; as is also Mont Perdu, the next in altitude. The depressions (called "Ports" in the medial ridge, and usually "Cols" in the transversal ones) are all of considerable elevation, often from 7000 to 9000 feet, and there are only two passes practicable for carriages, one at each extremity of the chain. On the southern or Spanish side the ascent is more abrupt than on the northern side, where two ridges (at least) parallel to the medial ridge, and yielding to it very little in height, are usually distinctly traceable. The Spanish Pyrenees are also watered by fewer streams, have fewer lakes, and are less clad with forests than the French. On both sides the valleys are in most cases steep; the *basins* we successively encounter in

* The altitudes are all in French measures, and I have given very few, for besides that I had not the opportunity of determining any myself, the altitude of the same mountain, as stated by different observers, often varies considerably.

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ascending them are usually small, and occupied either by lakes, or by alluvium deposited by the descending streams. In only two cases have I seen hollows filled with peat, one on Mont Goursi in the Basses Pyrénées, and the other at the head of a small valley, lateral to the Vallée de Lesponne in the Hautes Pyrénées.

The line of perpetual congelation in the Pyrenees, I assume from my own observations to be at an average height of nearly 9000 feet, or more than 1000 feet higher than in the Alps. One authority, now before me, fixes it at 8718 feet, and Ramond estimated it at from 8100 to 8400 feet, which I do not hesitate to say is much too low. It varies however considerably with the degree of exposure and even with the form of a mountain, and the snow is uniformly found to melt less, and consequently to descend lower in an eastern exposure than elsewhere. Hence, even on the highest mountains, the band of perpetual snow is not more than from one to two thousand feet broad.

The streams which take their rise on the *southern* slopes of the Pyrenees flow nearly all into the Ebro. On the *northern* slopes, the space lying opposite the western half of this drainage of the Ebro is occupied by the Adour and its tributaries, while the space corresponding to the eastern half, extending from the source of the Adour to that of the Arriège, is occupied by the upper part of the basin of the Garonne. In the extreme eastern angle, on both the northern and southern side, are various small streams which run directly into the Mediterranean. This drainage of the rivers would seem to afford us the basis of a division of the Pyrenees, for the purpose of estimating the distribution of plants on their surface; but on trial such a division will be found intractable, and I prefer another which separates the plants into more distinct groups, and corresponds very nearly with that adopted by the *botanistes sédentaires* of the Pyrenees. I divide the Pyrenees into *three districts*, the *Western*, the *Central*, and the *Eastern*, the limits of which I proceed to define.

The *Central Pyrenees* are comprised between the upper part of the Gave de Pau, from its source at the Cirque de Gavarnie as far as to the bridge of Lourdes, on the *west*; and Mont Maladetta and the Vallée d'Aran, watered by the infant Garonne, on the *east*; or from the meridian of Greenwich* to about 50 minutes of east longitude. This district includes, in France, the upper part of the Dept. of the Haute Garonne and most of the upper part of the Hautes Pyrénées; in Spain, part of Aragon and a very small angle of Catalonia. It is watered by the upper

* The village of Luz, in the valley of Barèges, is exactly in the longitude of Greenwich.

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branches of the Adour and Garonne, and contains the highest mountains and the deepest valleys in the Pyrenees, as well as the most extensive forests. Glaciers of great extent are found in this district only; the principal are those which occupy the northern slopes of the Maladetta and Crabioules.

The *Western Pyrenees* extend from the Central to the ocean at Bayonne and St. Jean de Luz. They include, in France, the Dept. of the Basses Pyrénées and part of the Landes, stretching as far as the Adour at St. Sever and Dax, besides a small portion of the Hautes Pyrénées; in Spain, a small part of Navarre and most of the northern part of Aragon. This district extends farther to the north than either of the others; it is consequently colder at the same altitude, and in the sandy plains bordering on the Adour and the ocean the climate is much more humid.

The *Eastern Pyrenees* are comprised between the Central and the Mediterranean. In France they occupy the whole length of the Depts. of Arriège and Pyrénées Orientales; in Spain, nearly all the northern part of Catalonia. This district is the most southern, the warmest and driest, and the most denuded of forests of the whole three*.

A rough sketch of the mineralogy of the Pyrenees, so far as it is connected with the distribution of plants, will conduce to a more complete idea of the peculiarities of these divisions. The igneous rocks of the Pyrenees do not, as in the Alps, constitute some of the loftiest mountains, and the highest point at which I am aware of the existence of granite is on the summit of the Pic du Midi d'Ossau (9186 ft.), unless it attains the summit of Néouvielle (9696 ft.), as some maintain. In the eastern part of the Western Pyrenees it constitutes the mass of the mountains above Cauterets, especially those which include the valleys of Combascou, Lutour and Jéret, and the Lac de Gaube; from whence it passes (by the Vallée d'Azun, &c.) into the upper part of the Vallée d'Ossau, where I have observed it from below the Eaux Chaudes to the Pic du Midi, and on the circumjacent mountains, in which it is the predominant rock. From the Vallée d'Ossau it dips at once so profoundly as not to be observed in the deepest parts of the Vallée d'Aspe, or in any of the valleys to the westward, until it reappears near Bayonne, in the *massif* of Cambo. In the Central Pyrenees it appears in the valley of Barèges (continued from the valley of Cauterets) and about the base of the Pic du Midi de Bigorre; but, with this latter excep-

* I should add, that great part of the Arriège is still a *terra incognita* to me, and I especially commend its exploration to resident cryptogamists. Probably, from its containing some very lofty summits, as the Pics of Montcalm and Estats, both its character and its vegetable products would require the western part of it to be annexed to our Central district.

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tion, it rarely attains the surface in the neighbourhood of Bagnères-de-Bigorre. Near Bagnères-de-Luchon it appears in most of the valleys and at the base of the mountains. From the Central Pyrenees it passes into the Eastern, where, especially in the Dept. of Pyr. Orientales, it constitutes a very large proportion of the surface. In the granite I include gneiss, and possibly some other rocks whose internal structure is of nearly the same character.

Mica-slate (*schiste-micacé*) I have observed in the Western Pyrenees only in the valley of Cauterets, especially at the base of the Monné and on Mont Lizé. Thence it passes into the Central district, where it constitutes the terminal cone of the Pic du Midi, the Pic de Mont-Aigu, and all the adjacent mountains. The wall of rock which supports the waters of Lac Lehou is of mica-schist, and in general the embankments of all the lakes in the Pyrenees are of this rock or of granite. In the Eastern Pyrenees the mountains on the western side of the river Aude are of mica-schist, and I am not aware of its occurrence elsewhere.

Slate (*schiste-argileux*) may be regarded as the most important rock in the Pyrenees, appearing as it does in every part of them. In the W. Pyrenees I have observed it in the Vallée d'Ossau; also near Argélez, where it is the predominant rock, extending from thence along the gorge of Luz to the valley of Barèges, where it meets the mica-schist and other primary rocks. Ascending from Argélez by the valley of Cauterets, it extends (though not uninterruptedly) to the very summit of the central chain. The Port de Cauterets and all the other passes which have fallen under my notice are (as in the Alps) excavated in slate-rock, which is often very siliceous, and cleaves with difficulty in at least two directions. From Cauterets the slate passes into the Central Pyrenees, descending almost to their bases, and attaining the ridge of the central chain, as at the Port de Bénasque, &c. In the Eastern Pyrenees it would seem to occur chiefly about the base of the mountains, skirting the granitic nucleus. The lower mountains in the Pyrenees, whose chief constituent is clay-slate or grauwacke, have commonly rounded summits, and are covered with herbage; but the loftier ones, and especially those of the medial ridge, have a bolder aspect; their sides are furrowed by deep ravines, and their summits are serrated and peaked. When closely examined they are found to be in a state of continual decomposition and degradation, probably from the dissemination of iron pyrites in these rocks.

Transition-limestone (*calcaire de transition*) constitutes also its proportion of the surface of the Pyrenees. In the W. Pyrenees it forms the principal part of the ridge of the central chain, lying to the south of the Pic du Midi d'Ossau. From the val-

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ley of Cauterets it would seem to be entirely absent, but it reappears in the Central Pyrenees in the great valley of Barèges, where it extends from the bottom of the valley of Gèdre to a little beyond the lake of Gavarnie, and plunges under the immense mass of alpine limestone of the Marboré. The lower hills near B.-de-Bigorre, especially the Pic de Lhieris, are formed almost entirely of it, and here it often presents itself in thin beds, alternating with clay-slate. In the upper part of the valley of Luchon, and in all the surrounding mountains, I do not recollect to have observed any calcareous rock. In the E. Pyrenees, transition-limestone would seem to occur amongst the granitic formations in detached masses (accompanied however by slate) chiefly in the neighbourhood of Villefranche and Prats de Mollo, and in the Corbières. The ascents of mountains of transition-limestone are interrupted by escarpments, which are rarely of great elevation.

Of secondary rocks, the only one which I shall have occasion to mention is oolitic limestone (*calcaire alpin*). To this rock the Pyrenees owe some of their grandest features, as it forms escarpments in some instances considerably exceeding a thousand feet in altitude, as at the Cirque de Gavarnie, the termination of the Vallée d'Estaubé, &c.; but wherever it attains the alpine region (as in the instances just cited) I have found it quite destitute of mosses, probably from its exposed position, above the region of forests. It is only in the lower hills of the Western Pyrenees, especially near Pau, where it occurs as a conglomerate, that the alpine limestone has afforded me any cryptogamia. Some of Dr. Arnott's mosses from the Pyr. Orientales, judging from the fragments attached to the specimens, have been gathered on alpine limestone.

Trap-rocks I have remarked in the Pyrenees in small detached masses, but I have gathered cryptogamia only on a rapidly decomposing ophite at Labassère near B.-de-Bigorre, and at St. Pandelon near Dax.

This brief sketch of the chief rocks of the Pyrenees is confessedly very imperfect; it is also designedly *superficial*, for it is only by the surface-rock that plants whose roots rarely penetrate to the depth of an inch can possibly be influenced. The position, too, of any rock in the geological series cannot be said to have anything to do with the distribution of plants, though the presence of a certain mineral is in many cases essential to their existence. From my observations in the Pyrenees and elsewhere, I have ascertained pretty accurately what mosses require a matrix containing *carbonate of lime*; these will be specified as they occur. They have obviously no preference for primitive, transition, or secondary limestone, but they are always most abundant and

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luxuriant on limestones of which the surface rapidly decomposes; hence the older limestones, which in the Pyrenees are often transformed into marble, are never in that state prolific in mosses. Of those species which absolutely *refuse* to vegetate on limestone (and they are not very numerous), some are found on a great variety of rocks; but probably when carefully examined these rocks would be found to contain some one element, essential to all the species making choice of them. *Silex*, for example, seems necessary to certain *Grimmiæ*; and there are a few mosses rarely found except on rocks containing a large proportion of iron. It is scarcely necessary to mention that many mosses are never found on rocks at all, but by exception, some preferring the bark of living trees (*cortical*) and others decayed trunks or logs (*lignal*).

Distribution of Musci and Hepaticæ in the Pyrenees, according to latitude and longitude.—The distribution of plants on any given portion of the earth's surface requires to be estimated both *horizontally* and *vertically*, and if the surface to be considered extend through several degrees of latitude, the two modes will require to be exhibited both separately and in combination. It is obvious that a comparison of the vegetation of any portion of the earth with that of any other portion, or of the whole, must always be incomplete, until the whole of the earth's surface shall have been examined. Hence the following account of the distribution of Musci and Hepaticæ in the Pyrenees can only be regarded as approximatively correct. I enumerate 390 Musci and 91 Hepaticæ in the Pyrenees. Taking the whole number of Musci known in the world to be 2400 (which is rather over than under the limit), and of Hepaticæ to be 1200, this would show the Pyrenees to possess nearly one-sixth of the entire family of Musci and but one-thirteenth of the Hepaticæ, or twice as great a proportion of the former as of the latter. But this proportion is very nearly what we should arrive at in comparing the Musci and Hepaticæ of Europe with those of the rest of the world, so much more numerous are Hepaticæ in the southern than in the northern hemisphere.

The species which attain absolutely their northern limit in the Pyrenees seem to be only the four following :—

Hypnum aureum.	Tortula cæspitosa.
Bryum platyloma.	Southbya tophacea.

Those which attain their southern limit are apparently much more numerous; but when the mountains of Spain come to be fully explored, the list will probably be somewhat lessened; and I ought to acknowledge that, possessing no complete list of the Cryptogamia of Italy, I may have assigned the Pyrenees as the southern limit for a few species which in reality extend farther

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south in Italy. So far however as I can ascertain, the following species have their southern limit in the Pyrenees:—

Hypnum umbratum.
Pyrenaicum.
plicatum.
flagellare.
striatulum.
cæspitosum.
crassinervium.
Vaucheri.
pumilum.
campestre.
Starkii.
Mühlenbeckii.
pratense.
Haldanianum.
heteropterum.
catenulatum.
Sprucii.
trichophorum.
planifolium.
Isothecium rufescens.
chryseum.
Leskea rostrata.
longifolia.
Anacamptodon splachnoides.
Mielichoferia nitida.
Catoscopium nigritum.
Bartramia marchica.
Bryum acuminatum.
polymorphum.
Zierii.
concinnatum.
Ludwigii.
obconicum.
julaceum.
Mnium spinosum.
Mnium spinulosum.
medium.
Aulacomnion androgynum.
Physcomitrium acuminatum.
Tortula alpina.
latifolia.
aciphylla.
papillosa.
Dicranum fulvum.
longifolium.
Sauteri.
Arctoa fulvella.
Anodus Donnianus.
Orthotrichum Bruchii.
rivulare.
urnigerum.
Hedwigia imberbis.
Grimmia anodon.
curvula.
sulcata.
atrata.
Encalypta commutata.
rhabdocarpa.
Polytrichum sexangulare.
Fissidens grandifrons.
Sarcoscyphus adustus.
Alicularia compressa.
Jungermannia sphærocarpa.
Genthiana.
cordifolia.
Lyoni.
Francisci.
Lejeunia ovata.
Frullania fragilifolia.
Dumortiera irrigua.

Few species can be expected to attain their eastern limit in the Pyrenees (lying as they do on the *western* side of Europe), and I can find only these six, of which all but one (*Fissidens grandifrons*) had been previously supposed to be confined to our own islands:—

Hypnum cæspitosum.
Tortula papillosa.
Fissidens grandifrons.
Lejeunia ovata.
Frullania fragilifolia.
Dumortiera irrigua.

The number of Musci and Hepaticæ which are not found anywhere to the westward of Europe, either on the continent of America or in the intermediate islands, is considerable, and they mostly attain their western limit in the British Isles. Some species which reach their western *European* limit in the Pyrenees (not being found in the British Isles) reappear in N. America, under nearly the same latitude: such are *Hypnum Haldanianum*,

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Leskea rostrata and *attenuata, Physcomitrium acuminatum, Tortula cæspitosa, Dicranum fulvum, Fissidens grandifrons,* &c. *Tortula chloronotos* reappears in the isle of Teneriffe. There are only the following species whose occurrence westward of the Pyrenees has not yet been recorded :—

Hypnum Pyrenaicum.
Vaucheri.
Isothecium Philippianum.
Bryum polymorphum.
Mnium medium.
Tortula inclinata.
Encalypta ligulata.
Buxbaumia indusiata.
Plagiochila Pyrenaica.
Scapania apiculata.

Of the few mosses which grow on the southern slope of the Pyrenees, only one species (*Tortula cæspitosa*) was not found at all on the northern. The Spanish Pyrenees have in fact a peculiarly arid aspect (to the eye of a cryptogamist), and correspond well with the distant view I have had of the dry and naked sierras of Spain*.

If we now compare the three districts of the Pyrenees, above defined, one with another, we find a considerable number of species peculiar to each. The following mosses, gathered in the *Western Pyrenees*, were none of them observed in the Central and Eastern Pyrenees. [Those species marked with a (†) are peculiar to the sandy plains of the Landes.]

Hypnum strigosum.
megapolitanum †.
cæspitosum †.
trichophorum.
Catoscopium nigritum.
Bryum Tozeri.
cæspiticium.
erythrocarpon.
torquescens.
platyloma.
Muelleri †.
Mnium spinosum.
Funaria convexa †.
Entosthodon Templetoni †.
Physcomitrium ericetorum.
acuminatum.
Tortula ambigua †.
papillosa.
latifolia.
cæspitosa.
Trichostomum luridum.
subulatum †.
Dicranum spurium.
Weisia cirrhata †.
Wimmeriana.
Gymnostomum calcareum.
Ptychomitrium pusillum.
Orthotrichum crispulum.

* Cavanilles, in his 'Observaciones sobre la Historia Natural, &c. del Reyno de Valencia (Madrid, 1795),' amongst all the localities which he so minutely describes, mentions but one of bryological promise, where he observed the *solitary moss* which enters into his catalogue of the plants. In speaking of the mountains of Valldigna (p. 218) he says, "Los montes por donde están expuestos al mediodia son secos, y que no hay fuentes en sus raices : al contrario las faldas septentrionales de todos ellos están sembradas de sitios húmedos y frondosos, y en las raices nacen fuentes abundantes. . . . . En el valle de Barig son innumerables las fuentes que nacen desde Aldaya hasta Puigmola. . . . . En estos sitios húmedos y sombríos está siempre viva la naturaleza, cubierto el suelo de vegetales, y casi siembre de flores : allí se disputan las plantas el terreno. La doradilla (*Ceterach*), el polipodio comun, el pteris (*Pt. aquilina*) y la jungermania allanada (*Jg. complanata*) occupan las hendeduras de las peñas."

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Orthotrichum patens.
urnigerum.
Conomitrium Julianum †.
Buxbaumia aphylla †.
Sphagnum cuspidatum †.
compactum †.
Alicularia compressa.
Southbya tophacea.
Jungermannia curvula.
minuta.
dentata †.
Lejeunia ovata.
calcarea.
Frullania fragilifolia.

The whole of the following were observed only in the *Central Pyrenees* :—

Hypnum Pyrenaicum.
flagellare.
aureum.
falcatum.
Haldanianum.
heteropterum.
planifolium.
depressum.
Neckera pumila.
Entodon cladorrhizans.
insidiosus.
Isothecium Philippianum.
striatum.
Leskea rostrata.
longifolia.
Hookeria lucens.
Anacamptodon splachnoides.
Bartramia marchica.
Bryum pyriforme.
longicollum.
Ludwigii.
julaceum.
concinnatum.
cirrhatum.
Mnium lycopodioides.
medium.
Dissodon Frœlichianus.
Anacalypta latifolia.
Tortula vinealis.
Ceratodon cylindricus.
Distichium inclinatum.
Dicranum fulvum.
majus.
falcatum.
Arctoa fulvella.
Campylostelium saxicola.
Brachyodus trichodes.
Anodus Donnianus.
Seligeria recurvata.
Ancectangium compactum.
Zygodon conoideus.
Orthotrichum rivulare.
Grimmia anodon.
funalis.
sulcata.
Fissidens osmundioides.
Tetrodontium Brownianum.
Sphagnum acutifolium.
squarrosum.
Sarcoscyphus adustus.
Jungermannia Schraderi.
Genthiana.
pumila.
cordifolia.
divaricata.
connivens.
Lophocolea minor.
heterophylla.
Harpanthus scutatus.
Chiloscyphus polyanthos.
pallescens.
Dumortiera irrigua.

The following species are peculiar to the *Eastern Pyrenees*, and when the Hepaticæ of that district come to be ascertained, the list will undoubtedly be extended :—

Hypnum fluitans.
recognitum.
Fabronia pusilla.
Bartramia stricta.
Bryum bimum.
Tortula mucronifolia.
alpina.
Tortula subulata, var. inermis.
gracilis.
Orthotrichum Sturmii.
Grimmia plagiopoda.
trichophylla.
Polytrichum sexangulare.

In glancing over the above lists, we cannot fail to be struck with the great number of species, especially of pleurocarpous mosses, peculiar to the central district. The obvious and true

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explanation of this is to be found in what is above remarked respecting the depth of the valleys and the extent and density of the forests; pleurocarpous mosses demanding in the latitude of the Pyrenees a great deal of shade.

A few species, occurring in both the Central and Eastern Pyrenees, were not observed in the Western. They are:—

Hypnum reflexum.
Mielichoferia nitida.
Bryum polymorphum var. curvisetum.
Timmia megapolitana.
Trichostomum tophaceum.
Desmatodon nervosus.
Dicranum longifolium.
virens.
Grimmia atrata.
Cinclidotus aquaticus.

The list of species wanting to the Eastern Pyrenees, but observed in both the Western and Central, is so very large that I forbear to insert it, feeling assured that when the former district comes to be explored as the two latter have been, it will be found much less deficient than this list would show it. Three mosses, *Amblyodon dealbatus, Tortula marginata* and *cuneifolia*, growing in both the Eastern and Western Pyrenees, have not hitherto been observed in the intermediate district.

Were I now asked to name *a moss characteristic of the whole Pyrenees*, I should say at once *Fissidens grandifrons*, Brid. (the *Dicranum palmiforme* of Ramond), which is a conspicuous ornament wherever moist calcareous rocks are found, but is scarcely met with out of the Pyrenees*. Amongst the Hepaticæ, *Jungermannia acuta* is scarcely less abundant, growing on the same sort of rock. The following species may also be considered respectively characteristic of our three districts, viz. *Southbya tophacea* of the *Western*, *Isothecium Philippianum* of the *Central*, and *Bartramia stricta* of the *Eastern*.

Distribution of Musci and Hepaticæ in the Pyrenees, according to altitude.—We come next to treat of the *vertical* distribution of plants, the most interesting branch of *Phytostatics*. In attempting to define our zones of altitude by natural boundaries,

* It will not be out of place to mention here a curious circumstance relating to this moss. Its *fruit* has never yet been found, and even its *flowers* were unknown when it was figured in the 'Bryologia Europæa.' A few years ago, Mr. Sullivant discovered female plants at the Falls of Niagara, and in 1846 he published the specimens in his beautiful 'Musci Alleghanienses' (no. 186). In Jan. 1846, a single tuft of male plants was found by myself and M. Philippe on a dripping limestone rock near Bagnères, and the inflorescence will be described in the proper place. These are all the flowers that have ever been found, and it will be a remarkable circumstance if it be ascertained (as this would seem to show) that *only the male plant exists in Europe, and only the female in America*! The obvious conclusion would be that the plant never had fruited, and without artificial aid never would fruit. It has, however, ample means of maintaining and spreading itself without the aid of seeds.

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that is, by certain plants which constitute a marked feature in them, it would seem at first sight a great advantage could we select in every country the same species for this purpose; but a little research will suffice to show us the impracticability of this. To go no farther than the Alps; near as they are to the Pyrenees, and similar as their vegetation is in many respects, there are yet important differences. While, for instance, there is no tree in the Alps above the region of the spruce-fir (*Pinus Abies*, L.), in the Pyrenees there is above this a broad and well-marked belt of Scotch fir (*Pinus sylvestris*, L.). Again, there is in the Alps, above the limit to which the oak ascends, a zone in which the birch (*Betula alba*, L.) is the predominant tree; but in the Pyrenees the birch is excessively rare; indeed I do not at this moment recollect having anywhere seen it where I could be certain it had not been planted, and I perceive Mr. Bentham includes it in his catalogue with a mark of doubt. It would also be quite impossible to define any of our climatal zones in the Pyrenees by the distribution of the *heaths*, as has been done for the British Isles by Mr. Watson in his 'Cybele Britannica.' The only "heath-clad hills" I have seen in the Pyrenees, reminding me of our English and Scottish hills, are some of the lower mountains around Bagnères-de-Bigorre, and here the prevailing species is *Erica vagans*, though *Calluna vulgaris* occurs also, sparingly. The latter species seems never to penetrate far into the mountains. Again, *Erica tetralix* is not found at all in the Central or Eastern Pyrenees, but only in the Western. The only heath I have remarked near Bagnères-de-Luchon is *Erica cinerea*. *E. arborea* is abundant in the valley of Argélez and its tributary valleys (Castelloubon, &c.), but is absent from the Central Pyrenees, while it reappears in several parts of the Eastern. It has been shown by M. des Moulins ("État de la Végétation sur le Pic du Midi de Bigorre, &c.;" 'Recueil des Actes de l'Académie Royale de Bordeaux,' 1844), that several species of *thistles* occupy zones of altitude in the Pyrenees which are easily ascertained, and he has actually constructed a scale of the distribution of fourteen species in the Pyrénées Centrales, showing the altitudes at which they appear and disappear. But were this scale taken as the basis of a climatal arrangement (which M. des Moulins by no means proposes), how would it assist us in comparing the flora of the Pyrenees with that of Lapland, where according to Wahlenberg, "Cardui in sylvis admodum rari, omnesque fere inermes sunt. De cætero quoque plantæ vel frutices *aculeati* in Lapponia non crescunt, &c."?

In comparing two distant portions of the earth's surface with each other, in both of which the same plant is extensively distributed, we are not hence to conclude that the zone which it oc-

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cupies has in both countries the same *average annual temperature*. Were this the case, such discrepancies as the following would be inexplicable. On Mount Etna, the beech, the birch and the Scotch fir are said to occupy the same zone. In the Pyrenees the beech ceases before the Scotch fir begins, and in the Alps the birch is said to fail even below the spruce-fir. But in Lapland the birch extends far above the Scotch fir, and in fact ascends higher on the mountains than any other tree. Assuming the correctness of these observations (which for Lapland and the Alps cannot be questioned), we are bound to conclude that there are peculiarities of constitution in certain species which enable them to ascend proportionally higher in one latitude than in another *. In other words, an *alpine* flora is not necessarily an *arctic* flora, in its character. Hence the saying of Linnæus, "Plantæ diversæ indicant altitudinem perpendicularem terræ," must be regarded not as an *axiom* but as a *problem*, the complete solution of which still remains to be effected.

It will readily be admitted that all our artificial arrangements,

* The discussion of this *idiosyncrasy* would demand an entire volume, but Wahlenberg's explanation of it (Flora Lapponica, Introd.) is worth quoting, and should be borne in mind in comparing the flora of the Pyrenees or of the Alps with that of Lapland. "Valde probabile mihi videtur *a calore meridiano* vegetationis gradum præcipue pendere" (p. xlix, l. c.)—"*Temperies* tantum illa *æstivalis* in vegetatione producenda efficax, constituit *clima*, ejusque gradus determinat." (p. lii.)—"Aliæ plantæ *longam magis, quam calidam æstatem* sibi exposcunt: ubi temperatura æstivalis media *per tres menses* gradum 8°·5 (Centigr.) haud attingit, ibi hordeum haud ad maturitatem pervenire potest. Hoc quidem jamdudum infra Enontekis contingit; sed nihilominus tamen arbores variæ æstate brevi et calida hujus regionis contentæ sunt: Betulæ enim et Salices alpes versus longe altius læte propagantur. Arbores coniferæ fere ac Hordeum æstatem longiorem quamquam temperatiorem, requirunt, itaque longe altius ascendunt in alpibus Helveticis quam Betula, &c. Ex observationibus thermometricis allatis constat, *æstatem in alpibus Helveticis, etiamsi temperatior sit, fere longiorem esse, quam in alpibus Lapponicis*; et pro certo scimus, temperaturam mediam omnium mensium per totum annum eo magis æquabilem esse in montibus Andium Americæ meridionalis, et igitur omnes arbores, calidiorem quam longiorem æstatem requirentes, ibi crescere desinunt duplo longius infra limitem nivalem quam apud nos; sed Hordeum aliaque Cerealia temperie moderata 7 vel 8 graduum contenta, si ea modo longior sit, duplo altius versus limitem nivalem ibi adscendunt quam omnes arbores." (p. liii.)

It is also well known that some plants will bear *forcing*, that is, will survive and flourish under constant excitement and irritation, much better than others; hence we could hardly expect any plant which will not bear some degree of forcing, to thrive in the rapid summer, with its long days and proportionally great meridional heat, of countries bordering on the Arctic circle; should it even subsist through the rigorous winter of that region.

I am sensible how much the absence of exact thermometrical observations takes away from the completeness of this sketch of part of the flora of the Pyrenees. I have none of my own to adduce, except a few made at the foot of the Western Pyrenees in the month of June, when I found the meridional temperature to often exceed 90° Fahrenheit.

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whether phytostatical or phytological, are imperfect; yet they have all their use in placing the same object before us under different points of view. As regards the Pyrenees, I have judged it best under all the circumstances to adopt the climatal arrangement sanctioned by the usage of the most eminent resident botanists. The first exposition of this is to be found in the writings of Ramond, one of the earliest observers in geographical botany. He ascertained that the oak (*Quercus robur*) ascended from the plains to the height of 1600 metres; that the beech (*Fagus sylvatica*) occupied a zone of from 600 to 1800 metres; the fir (*Pinus Abies*) and the yew (*Taxus communis*) a zone of from 1400 to 2000 metres; and that the Scotch fir (*Pinus sylvestris*), commencing at the latter limit, ascended in its smaller forms (especially that called *Pinus Mughus* by Jacquin) as high as 2400 metres. Above this limit (he observes) there are no more trees. Here commence *shrubs, with dry leaves, and mostly procumbent or prostrate stems,* which are concealed under the snow during the winter. Such are *Rhododendron ferrugineum,* various species of *Daphne, Passerina* and *Globularia, Salix herbacea* and *reticulata,* &c. Leaving these, we meet humble herbs with *perennial roots, leaves in rosettes* and mostly *naked stems*: first in the series are *Gentiana campestris, Primula villosa, Saxifraga longifolia, Aizoon,* &c.; next, *Ranunculus alpestris, nivalis* and *parnassifolius, Androsace alpina,* &c.; lastly, *Ranunculus glacialis, Saxifraga cæspitosa, oppositifolia, androsacea* and *grœnlandica* (Lapeyr., non L.): these, with lichens, reach 3000 or even 3400 metres, and extend to and even beyond the line of eternal snow. Guided by these observations of Ramond, and by others of his own, M. des Moulins, in the admirable memoir above-cited, has proposed to divide the Pyrenees into zones of altitude, as follows. The commencement of the *subalpine zone* he places at 4200 feet, about which altitude the cultivation of esculent vegetables (rye, potatoes, cabbages, &c.) ceases. It extends as far as 6000 feet, which is the upper limit of the growth of the spruce-fir and the beech*. The plants of the mountains, united with certain plants frequent in the plains, form the basis of its vegetation, and the real *subalpines* attain in it their greatest development both as to size and number. *Meadows* are scarce in this zone and do not occur above it.

The alpine region M. des Moulins divides into *three zones*. First, the *inferalpine,* which extends from 6000 to 7200 feet, and is characterized chiefly by the presence of *Pinus sylvestris,* which

* My own observations are here somewhat at variance with those of M. des Moulins. The beech has seemed to me to fail ordinarily some hundred feet below the fir, and in effect about the point where the latter attains its greatest development.

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even in its most stunted form scarcely passes the upper limit. *Rhododendron ferrugineum* expires in this zone at from 6600 to 6900 feet, and above this altitude the herbage is composed chiefly of *Nardus stricta* (a grass common in the marshes of the Landes!) and of *Festuca eskia*, Ram. (*F. varia* γ. *crassifolia*, Koch; *Eskio*, *Jispet* and *Oursagno* of the mountaineers of the Pyrenees). Amongst the shrubs characteristic of this zone may be mentioned *Vaccinium Myrtillus* and *uliginosum*, *Empetrum nigrum*, *Sorbus chamæmespilus* and *Salix Pyrenaica*; amongst the herbaceous plants, *Silene ciliata* and *Arenaria ciliata*. *Crocus multifidus*, which is a conspicuous ornament of the lower mountains (as around Bagnères-de-Bigorre), reaches the very summit of the inferalpine zone.

The *medialpine zone* extends from 7200 to 8400 feet. *Festuca eskia* attains the upper limit of this zone, but *Nardus stricta* fails below it. *Juniperus nana* is the giant of the vegetation, already so much contracted. Here the *weeds* which follow the traces of man and of the domesticated animals from the plains, cease to exist. The following species are abundant in this zone: *Statice alpina*, *Gentiana alpina*, *Potentilla nivalis*, *Cherleria sedoides*, *Silene acaulis*, *Iberis spathulata*, Berger., and *Pyrethrum alpinum*.

Lastly, above 8400 feet, in order to characterise the *superalpine zone*, we have merely to add to the plants of the middle zone a very small number of herbaceous plants, *all perennial*, and rarely descending into the medialpine zone. Such are *Ranunculus glacialis* and *parnassifolius*, *Stellaria cerastoides*, *Androsace alpina*, *Sibbaldia procumbens*, *Saxifraga grœnlandica*, Lap., and *S. androsacea*.

Thus far M. des Moulins. Of the zone below the subalpine, which I call the *Zona montosa*, he says nothing, because it was not necessary to his estimation of the flora of the Pic du Midi. It corresponds very nearly to Mr. Watson's "Agrarian Region," and were it our sole object to determine the distribution of Phanerogamia within its limits, it would be expedient to divide it into *three* zones, as M. des Moulins does the alpine region. Ascending from the plain, these zones might conveniently be separated, first by the upper limit of the cultivation of the *vine*, and secondly by that of *maize*, and the three divisions would be of nearly equal breadth. The cultivation of the vine in the Pyrenees is, as Humboldt observed it to be in South America, very nearly coterminous with the natural forests of chestnut-trees. It is true that chestnuts occur above the vineyards, but it is only sporadically; and so do vines occur here and there, trained to cottages in sheltered situations, considerably beyond the zone where they normally find a suitable climate. The cultivation of maize extends to about the point where the box

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begins to flourish luxuriantly. For the purpose, however, of estimating the climatal distribution of mosses, it will rarely be requisite to divide the montose zone; and where I find occasion to speak of an *inferior* and a *superior montose zone*, it is to be supposed divided into two equal portions.

In order to enable any one to compare more completely the distribution of plants in the Pyrenees with that of the rest of Europe, and especially with that of our own islands, I add the names of several plants which I have myself observed in the various zones, of which many of them have appeared to me characteristic.

Planities (= Z_0). Teesdalia nudicaulis, Helianthemum alyssoides et guttatum, Viola lactea, Silene bicolor, Lupinus angustifolius, Corrigiola littoralis, Illecebrum verticillatum, Hyoseris minima, Erica scoparia et ciliaris, Anagallis tenella et crassifolia, Pinguicula lusitanica, Phalangium bicolor, Avena Thorei, Agrostis setacea et elegans, Airopsis globosa, Cynosurus echinatus, &c. &c.

Zona montosa (= Z_1). *Pars inferior*. Ranunculus nemorosus, Anemone ranunculoides, Hepatica triloba, Geranium phæum, Saxifraga Geum, Asperula cynanchica, Prunella grandiflora, Stachys alpina, Euphorbia hyberna et dulcis, Cephalanthera ensifolia, Kœleria cristata, Melica ciliata.

Zona montosa superior. Potentilla micrantha, Orobus luteus, Saxifraga Geum, Astrantia major, Heracleum Pyrenaicum, Arnica montana, Cirsium Monspessulanum, Prenanthes purpurea, Soyeria lapsanoides, Scrophularia Scopolii, Erinus alpinus, Teucrium Pyrenaicum, Calamintha sylvatica, Rumex scutatus, Buxus sempervirens, Carex montana, Asplenium septentrionale.

Zona subalpina (= Z_2). Ranunculus aconitifolius, Spiræa Aruncus, Meconopsis Cambrica, Arabis alpina, Hutchinsia alpina, Cardamine latifolia et resedifolia, Viola cornuta, Dianthus Monspessulanus, Saponaria ocymoides, Geranium cinereum, Hippocrepis comosa, Trifolium alpinum, Sempervivum montanum, Saxifraga Geum et aquatica, Chærophyllum hirsutum, Sambucus racemosa, Galium vernum, Ramondia Pyrenaica, Scrophularia Scopolii, Digitalis purpurea et lutea, Linaria alpina, Veronica Ponæ et saxatilis, Tozzia alpina, Teucrium Chamædrys, Nigritella angustifolia, Lilium Pyrenaicum, Merendera Bulbocodium, Carex ornithopoda, Asplenium Halleri.

Zona inferalpina (= Z_3). Ranunculus Gouani, Helianthemum Œlandicum, Viola biflora, Gypsophila repens, Geranium cinereum, Trifolium alpinum, Dryas octopetala, Geum Pyrenaicum, Potentilla alchemilloides et rupestris, Epilobium alpinum, Paronychia serpyllifolia, Saxifraga Aizoon *β.* minor, Eryngium Bourgati, Aster alpinus, Homogyne alpina, Carduus carlinoides, Crepis pygmæa, Jasione perennis, Erinus alpinus var. hirsutus,

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Veronica aphylla, Bartsia alpina, Pedicularis comosa, Horminum Pyrenaicum, Pinguicula grandiflora, Androsace carnea et villosa, Primula integrifolia, Globularia nudicaulis et rupestris, Statice alpina, Salix Pyrenaica et reticulata, Luzula pediformis, Carex sempervirens, Festuca varia, Aspidium Lonchitis, Lycopodium Selago, Polypodium Phegopteris.

Zona medialpina ($= Z_4$). Ranunculus alpestris, montanus, Pyrenæus, Cardamine bellidifolia, Draba aizoides, Sisymbrium pinnatifidum, Saponaria cæspitosa, Arenaria purpurascens, Stellaria cerastoides, Cerastium alpinum, Cherleria sedoides, Geum montanum, Potentilla nivalis, Rhodiola rosea, Saxifraga aretioides, bryoides et muscoides, Asperula hirta, Aronicum scorpioides, Chrysanthemum alpinum, Erigeron alpinus, Gnaphalium leontopodium et supinum, Senecio Tournefortii, Crepis pygmæa, Taraxacum officinale var. alpinum, Campanula pusilla, Jasione perennis, Phyteuma hemisphæricum, Euphrasia minima, Pedicularis Pyrenaica et rostrata, Pinguicula alpina, Soldanella alpina, Daphne Cneorum, Veronica alpina, Juniperus nana, Juncus trifidus, Luzula spadicea et pediformis, Carex Pyrenaica, Festuca varia.

Zona superalpina ($= Z_5$). Cardamine bellidifolia, Draba nivalis, Potentilla nivalis et Salisburgensis, Saxifraga bryoides, granulata *var.*, muscoides et grœnlandica, *Lap.*, Senecio Tournefortii, Gentiana alpina, Myosotis sylvatica *var.* alpestris, Pedicularis rostrata, Soldanella alpina, Statice alpina, Salix retusa et herbacea, Luzula spicata, Carex curvula et nigra, Agrostis vulgaris *var.* alpina, Sesleria disticha.

Throughout the following catalogue of the mosses, the zones which each species occupies will be distinctly specified; and to enable me to do this in the smallest possible compass, I propose the notation of *zones* above indicated, that is to say, Z_1 for the first zone above the plain, Z_2 for the second, &c., and Z_0 for the plain itself. It is in many cases difficult to ascertain the zone in which a moss has normally its station, for in mountainous countries the seeds, &c. of mosses are carried down by the streams, precisely as those of flowering-plants are; but a large proportion of mosses are found *only* near streams, and that especially in a low latitude, where the requisite degree of moisture is more rarely met with. Hence certain mosses, natives of the alpine region, are occasionally found some thousands of feet below it. To take an instance in *Grimmia spiralis*, a species which is stated by the authors of the 'Bryologia Europæa' to have its "véritable habitat au-dessus de toute végétation forestière." Near Cauterets, opposite the baths of La Raillère, on the rude blocks of granite which are thickly strewn along the banks of the Gave de Marcadaou, this species forms large lax tufts, disfigured by the sand of

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the stream, yet bearing a few capsules. This is far *below the commencement of the subalpine zone*; but in continuing to ascend the stream, until we emerge on the broken plain adjacent to the Lac de Gaube, where the only trees are a few scattered pines (i. e. *towards the upper limit of the inferalpine zone*), we find the same species, forming small compact tufts and bearing a profusion of fruit, growing on the same sort of rock, and often far removed from any stream. *Here* it is obviously *at home.*

The localities visited within Z_5 are for the most part entirely destitute of mosses, in consequence of the declivities being covered with *sliding* fragments of schistose rock. Two species of Hepaticæ, *Sarcoscyphus emarginatus* and *Alicularia scalaris*, common in the plains, ascend in varying forms nearly to the limit of perpetual snow, and with *Jungermannia julacea* form the sole representatives of the tribe in Z_5. I must also observe, that nowhere in the Pyrenees do mosses and lichens ascend higher than *all* flowering-plants. Even above the line of perpetual congelation, wherever a rock peeps out of the snow (its sides being too steep for the snow to rest upon them), Saxifrages, and two or three other kinds of plants equally hardy, fix themselves in its crevices. This is also the case with lichens, but scarcely with *real frondose mosses*, and I very much doubt whether there be any region in the world (alpine or arctic) where mosses leave below them *every* phanerogamous plant, although we have long been taught to believe that such is the case. Ramond found flowers to accompany Mont Perdu almost to its summit.

I proceed now to exhibit in a tabular form a list of those Musci, Hepaticæ and Lichenes which have appeared to me characteristic of the various zones in the Pyrenees. I have considered a species characteristic of a particular zone for the following reasons: 1. It is either abundantly distributed in that zone throughout the chain, and scarcely seen above or below it; or, 2. It occurs at various (it may be distant) points of the chain, and nowhere abundantly, yet is always confined to one zone; or else, 3. It is distributed through several zones, but exists in its perfect state only in one. A few species flourish with equal luxuriance in two or more zones. Those mentioned for the superalpine zone were almost its sole occupants, and most of them were sterile. The species united by *brackets* were frequently grouped together *in one tuft*, so as to be taken up at once by the hand; or, in the case of crustaceous lichens, occupied the surface of *one stone*. The species printed in *italics* are considered peculiarly characteristic of the zone in which they are placed.

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Limes nivalis.	Musci.	Hepaticæ.	Lichenes.
Zona superalpina (= Z_5.) 8400′.	*Polytrichum juniperinum.* sexangulare. Encalypta rhabdocarpa. Hypnum molluscum var. *Desmatodon latifolius, var. muticus.* Weisia crispula var.	*Jungermannia julacea.* Sarcoscyphus emarginatus. Alicularia scalaris.	Parmelia chrysoleuca. *Lecidea atrobrunnea.* *Umbilicaria proboscidea var.* Endocarpon miniatum, var. complicatum.
Zona medialpina. (= Z_4.) 7200′.	Weisia crispula var. *Dicranum Starkii.* *Arctoa fulvella.* Grimmia sulcata. atrata. Tortula vinealis, var. nivalis Dissodon Frœlichianus. Anacalypta latifolia. *Bryum turbinatum, var. latifolium.* Hypnum plicatum.	Jungermannia julacea. Sarcoscyphus emarginatus. Alicularia scalaris. *Gymnomitrium concinnatum.*	Umbilicaria proboscidea. atropruinosa. Cetraria pinastri. Cladonia vermicularis. gracilis. *Lecidea Morio.* *confluens.* Wahlenbergii. Parmelia ventosa. Peltigera crocea.
Zona inferalpina. (= Z_3.) 6000′.	Hypnum plicatum. *Leskea incurvata.* *Tortula aciphylla.* Dicranum Starkii. *Desmatodon latifolius.* Hypnum reflexum. callichrous. Grimmia spiralis. ovata var. *alpestris.* Timmia megapolitana. Bryum polymorphum, var. curvisetum. *alpinum.* capillare var. 3. Bartramia ithyphylla. Gymnostomum curvirostrum Hypnum dimorphum.	Gymnomitrium concinnatum Jungermannia albicans var. trichophylla. Mastigobryum deflexum.	*Peltigera crocea.* Lecidea Wahlenbergii. *Parmelia ventosa.* Lecidea Morio. Parmelia badia. Biatora decipiens.
Zona subalpina. (= Z_2.) 4200′.	Hypnum dimorphum. Starkii. Bryum acuminatum. *Zierii.* *capillare var.* 2. *Hypnum Crista-castrensis* *uncinatum.* Schreberi. salebrosum. Halleri. subtile. Isothecium striatum. Bartramia Halleriana. Trichostomum glaucescens. Campylopus longirostris. *Grimmia elatior.* Gymnostomum rupestre. *Ptychomitrium polyphyllum.* *Grimmia ovata.*	Mastigobryum deflexum. Jungermannia trichophylla *curvifolia.* reclusa. Scapania apiculata. *Jungermannia nana.* *sphærocarpa.* lanceolata. riparia. acuta.	Cetraria juniperina. Parmelia ventosa. Biatora lurida. *Umbilicaria pustulata.*

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4200′.	Musci.	Hepaticæ.	Lichenes.
Zona montosa (= Z_1). Superior.	Pterogonium filiforme. *Leskea attenuata.* Entodon insidiosus. *Hypnum rugosum.* *abietinum.* catenulatum. Bryum elongatum. Dicranum polycarpum. *Rhabdoweisia fugax.* Orthotrichum Hutchinsiæ rupestre. *Tortula paludosa.* *Trichostomum tortile.* *Grimmia leucophæa.* Fissidens grandifrons. Bryum obconicum. Hypnum crassinervium.	Plagiochila Pyrenaica. *Jungermannia acuta.* Wilsoniana.	*Parmelia fulgens.* crassa. Lecidea candida. *vesicularis.* Verrucaria maxima. *Opegrapha cerebrina.* *Verrucaria Dufourei.*
Zona montosa (= Z_1). Inferior.	*Isothecium repens.* Hypnum Haldanianum. *pratense.* Teesdalii. *Leucodon sciuroides.* Dicranum montanum. Tortula revoluta. chloronotos. Bryum atropurpureum. Grimmia crinita. Fissidens incurvus.	*Jungermannia Wilsoniana.* Southbya tophacea.	
Planities. (= Z_0.) 0000′.	Hypnum illecebrum. Leptodon Smithii. Bryum torquescens var. Tozeri. Muelleri. Entosthodon Templetoni. Tortula cuneifolia. Trichostomum subulatum.	Jungermannia Francisci. Saccogyna viticulosa. Mastigobryum trilobatum. Reboulia hemisphærica. Riccia fluitans. natans.	*Parmelia chrysophthalma.* rubiginosa. *Clementiana.* Opegrapha elegans. Lyellii.

It was my intention to have given here a comparative view of the distribution of Musci and Hepaticæ in the Pyrenees and in the other great mountain-ranges of the world, as also with that of our own islands, but this introduction has already swelled to a tedious length, and I hasten to close it with a few general observations.

As there are certain flowering-plants which accompany the habitations of men and of cattle from the plains nearly to the tops of the mountains, namely, in the Pyrenees, *nettles, mallows* and *docks* (*Rumex Patientia*); so there are likewise certain mosses which cling with equal tenacity to these traces of civilization.

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The most notable are *Ceratodon purpureus* and *Funaria hygrometrica*. *Tortula ruralis* is associated with these until in the inferalpine zone it meets and is supplanted by *T. aciphylla*, which I have never seen away from the sheep-cotes and the huts of the shepherds. At about the same height *Hypnum rutabulum* and *Bryum capillare* give place to *Hypnum plicatum* and *Leskea incurvata*; these last, along with *Tortula aciphylla*, indicate the localities where the domesticated animals have taken up their temporary sojourn, throughout all the higher mountains.

The cryptogamic vegetation of the Pyrenees, taken in the *mass*, has great general resemblance to that of our own islands, especially of Ireland, and the species common to both attain nearly the same *comparative* altitude. Yet there are features in the former which would forcibly strike a bryologist accustomed only to the mosses of the British Isles. About the foot of the Pyrenees he would be struck with the luxuriant fructification of *Dicranum glaucum* and *Leucodon sciuroides*, the fruit of the latter being one of the greatest rarities of our islands; and he would equally remark the absence of *Bryum cæspiticium*, of which I gathered only a single tuft, on a wall near Oloron; nor has it been observed elsewhere in the Pyrenees, though we are accustomed to look on it as the commonest of mosses. *Bryum cernuum* and *inclinatum* are almost equally scarce, though frequent with us and ascending high into the mountains. Were he next to climb the lower calcareous hills, he would see *Hypnum rugulosum*, *abietinum*, and *Leskea attenuata* profusely covering the scattered stones and rocks, and forming quite a marked feature even in the scenery. But he would miss *Hypnum undulatum* and the *Sphagna* which ornament our moist turfy hills; and if he ascended higher, he would probably see no *Splachna* or *Andreæa*. The rarity of the latter cannot be attributed to the southern latitude of the Pyrenees, for they exist even under the equator, as for instance on Mount Pichincha. The abundance of these two genera in the Alps of Switzerland must give a character to their vegetation wanting in the Pyrenees; and in general the Alps would seem to be much more *mossy* than the Pyrenees, *above* the region of forests, giving birth for example to an immense number of *Brya*, which in the Pyrenees are nowhere abundant above the inferalpine zone. This may reasonably be attributed to the more northerly position of the Alps, to their extending through a far wider zone of latitude, and not consisting like the Pyrenees of a single narrow chain; and to their greater humidity, which is probably dependent on the immense breadth of snow that perpetually covers them. The species described in this catalogue as new have none of them been observed in the Alps, with the exception of *Hypnum Pyrenaicum*, which was the only one noticed

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above the subalpine zone; and there are a few other Pyrenæan mosses wanting to the Alps*.

Two *Jungermanniæ* exceedingly common in Britain, *Lophocolea bidentata* and *heterophylla*, are all but absent from the Pyrenees; and two others, *Jungermannia barbata* and *Ptilidium ciliare*, great ornaments of our mountainous districts, are altogether wanting. The latter attains its southern limit in the north of Italy; it is distributed throughout middle and northern Europe, but grows in greatest luxuriance within the Arctic circle. (Conf. Wahlenberg and the accounts of our Northern voyagers.)

According to Wahlenberg, there are in Lapland, as in the Pyrenees, extensive forests of *Pinus Abies* and *P. sylvestris*, and both descend into the plain; the former cease at the altitude of 800 feet and the latter at 1200 feet, indicating respectively the upper limits of the "regio sylvatica" and the "regio subsylvatica." But in the Pyrenees these trees ascend proportionally far higher than in Lapland; and that they do not occupy the same climatal zones we shall see by comparing the positions of a few mosses common to both countries. In the Pyrenees, *Tortula tortuosa*, *Bryum crudum*, *Didymodon capillaceus* and *Dicranum virens* are found in the region of coniferous trees, and are rarely seen above it; but these are precisely species mentioned by Wahlenberg as characteristic of his "Alpes inferiores," which are above the region even of the *birch* ("regio subalpina, Wahl."), and are characterized by the presence of *Betula nana*, *Diapenzia lapponica* and *Silene acaulis*. Yet the comparative altitudes attained by the mosses in the Pyrenees and in Lapland accord very nearly, and the species which ascend highest in the one for the most part do the same also in the other. Hence the zone occupied by a moss common to both has probably in both the same average *æstival* temperature.

The abbreviations made use of in this Catalogue are (besides those above-mentioned for the zones of altitude) *P. occ.*, *P. c.* and *P. or.* for *Pyrenæi occidentales*, *centrales* and *orientales*, respectively; *M. P.* for "*Musci Pyrenaici* quos in Pyrenæis centralibus occidentalibusque, necnon in Agro Syrtico, A.D. 1845–46 decerpsit Richard Spruce. Londini: 1847;" and *H. P.* for a similar fasciculus of the *Hepaticæ* of the Pyrenees, and of the same date.

I have made a point of citing the original description of each species, and one good figure of it, where such exists: the few synonyms that are occasionally given have been in most cases ascertained from authentic specimens.

* The number of species which I have found in the Pyrenees new to the flora of France is considerable; but I cannot give a correct list of them, as I have not the dates of several species discovered in the Alps and Jura and nearly contemporaneously in the Pyrenees.

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As to those localities which I owe to the observations of my friends, I have affixed an autopsial mark (!) to the finder's name in all cases where I have had the opportunity of examining his specimens; and where I have not only done this but have also observed the same species in the very same place, a similar mark of verification is attached also to the locality: see, for an example, the stations mentioned for *Hypnum Starkii*.

Ordo MUSCI.

Hemicyclum 1. *Pleurocarpi.*

Tribus 1. Hypnaceæ.

1. *Hypnum*, Dill., Linn.

Obs. A large proportion of the species of this genus inhabit the *Zona montosa superior* and the *Zona subalpina*, in some instances exclusively. In Z_3 they become much more rare, and above the line where forests disappear, *Hypna* can barely be said to exist. Of the rupestral species, the following were observed only on *calcareous* rocks or soil: *H. abietinum, recognitum, striatulum, murale, crassinervium, Vaucheri, Teesdalii, tenellum, rugosum, commutatum, polymorphum* and *depressum*. Of the other species, several are occasionally found on trees, but they all grow with equal facility on rocks or on the ground.

§ 1. Tamariscina.

1. *H. abietinum*, L. Sp. Pl. p. 1591; Hedw. Musc. Frond. iv. t. 32; M. P. 1.

Hab. Z_{1-2} in rupibus calcareis umbrosis, per Pyrenæos vulgatissimum, semper autem sterile.

2. *H. recognitum*, Hedw. Musc. Frond. iv. p. 92. t. 35.

Hab. Z_1 in Pyr. orientalibus; W. P. Schimper.

3. *H. tamariscinum*, Dill.; Hedw. Sp. Musc. t. 67. *H. proliferum*, L. Sp. Pl. p. 1590; M. P. 2.

Hab. Z_{0-3} in sylvaticis, passim.

§ 2. Umbrata.

4. *H. splendens*, Hedw. Sp. Musc. p. 262. t. 67.

Hab. Z_{0-3} locis umbrosis humidiusculis: fertile nusquam vidi.

5. *H. umbratum*, Ehrh. Crypt. Exsicc. n. 66; Hedw. Sp. Musc. t. 67; Sullivant! Musci Allegh. n. 2; M. P. 3.

Hab. Z_2 in nemore obscuro juxta cataractam *la Cascade du Cœur* dict., in valle *du Lys* P. centr.; necnon in valle *Jéret* P. occ.

6. *H. Pyrenaicum*, Spruce in Musc. P. n. 4: caule procumbente subdiviso, divisionibus irregulariter pinnatis, ramisque *stuppa radiculosa brevi, pallida, pinnato-divisa*, obtectis; *foliis* patentibus, ovatis (ramorum ovato-lanceolatis) apiculatis acuminulatisve, margine reflexis, *argute et subduplicato-serratis, nervo*

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tenui ultra medium evanescente (rarissime nervis binis) *et plicis tribus striæformibus* instructis.

Hab. in summa zona sylvatica (Z_3) montis *Crabioules*, saxa caulibus implexis dense obtegens. In Alpibus Helveticis et Tyrolensibus viget, sec. cel. Schimper.

Caulis procumbens, subdivisus, divisiones irregulariter pinnatæ vel subbipinnatæ, ramique crocei, subcurvati, dense foliosi et inter folia radicibus pallidis, decompositis, planis, versus basin 2–4 cellulas latis, obsessi. *Folia* imbricata, patentia, ovata, apiculata et acuminulata, apice subtorta, concava, margine reflexa, argute et in parte superiori subduplicato-serrata; plicis tribus striæformibus, media nervum debilem, sæpe ramosum, rarissime duplicem, supra medium evanescentem involvente, instructa; e cellulis minoribus areolata, lutescentia: *ramulina* angustiora, plica media fere obliterata et ex eo nervo manifestiori. *Flores* et *fructus* desiderantur.

Ab hoc differt *H. umbratum*, Ehrh., divisionibus bipinnatis, *ramulis gracillimis*; radiculis compressis, latioribus, e 5–6 cellularum seriebus conflatis; *foliis multo minoribus, magis patulis, caulem ramulosque haud velantibus*, plerumque nervis binis instructis.

Tab. XII. 1. *rami pars augm.*; 2. *folium caulis*; 3. *ramuli augm.*; 4. *apex folii augm. circiter* 240*ies*; 5. *pars stuppæ radiculosæ interfoliaris pariter aucta.*

Obs. Although this comes so near *H. umbratum* in essential character, it has yet a very different habit, arising from the less divided stems and the much larger leaves, which are imbricated at such an angle as not to allow the stem to appear between them. All the states of *H. brevirostre* differ from it in the *leaves being contracted below the long acumen*, and especially in their being prolonged at the base into *two semicircular free auricles*, which are inflexed and embrace the stem *; they are also usually *squarrose* and furnished with *two short nerves*. *H. plicatum*, Schleich., is very similar in habit, and has the leaves plicato-striate in the same manner, but the latter are *subsecund*, with *a longer nerve*, their *margins entire* and most widely reflexed at about two-thirds of their length. *H. Kamounense*, Harv. (Hook. Icones, i. t. 24. f. 10), an Indian species, seems also to approach it very closely, differing chiefly in the *shorter, almost obsolete nerve, the less sharply toothed margins of the leaves*, and their more twisted apices, often describing two spires.

§ 3. Squarrosa.

7. *H. brevirostre*, Ehrh. Pl. Exsicc. n. 85; Schwgr. Suppl. t. 225; M. P. 5.

Hab. Z_{0-2} in umbrosis fere ubique, copiose fructiferum.

8. *H. triquetrum*, L. Sp. Pl. p. 1593; E. Bot. t. 1622; M. P. 7.

Hab. Z_{0-3} in sylvaticis.

* This has not altogether escaped the notice of Schwaegrichen, who says of *H. brevirostre*, "folia cordato-ovata ..... angulis baseos lateralibus inflexis."

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9. *H. squarrosum,* L. Sp. Pl. p. 1593; Dill. t. 39. f. 38.
Hab. Z_{0-3} in sylvis, pascuis, etc., rarissime fructificans.

10. *H. loreum,* L. Sp. Pl. p. 1593; H. et T.! Musc. Brit. p. 181. t. 26; M. P. 8.
Hab. Z_{1-2} in umbrosis.

§ 4. Stellata.

11. *H. stellatum,* Schreb. Fl. Lips. p. 92; Schwgr. Suppl. t. 144.
Hab. Z_1 locis humidis, haud vulgatum.

12. *H. polymorphum,* Hedw. Sp. Musc. t. 66.
Hab. Z_{1-3} P. occ. et c. ad rupes calcareas. *Jurançon*; *Bagnères-de-Bigorre, &c.* In alpinis semper sterile invenitur.

13. *H. Halleri,* L. Diss. Musc. p. 34; Hedw. Musc. Frond. 4. t. 21; M. P. 58.
Hab. Z_2 P. occ. in regione media montis *Pic de Ger,* etiam circa *Cauterets*; P. c. loco *Labassère*: rupestre. "In Pyren. jugis depressis in planitiem excurrentibus;" Dufour apud Bridel Br. Un.

§ 5. Heteroptera.

14. *H. dimorphum,* Brid. Suppl. Musc. ii. p. 149; Grev. Scot. Cr. Fl. t. 160; M. P. 57.
Hab. Z_{2-3} locis umbrosissimis, terrestre; P. occ. circa *Cauterets*; P. c. *Lac Lehou* (Philippe!): P. or. *Mt. Canigou* et *Port Nègre* (Arnott!).

15. *H. heteropterum,* Bruch apud Schwgr. (sub *Pterogonio*): dioicum; caule prostrato, diviso, divisionibus subpinnatis; *foliis laxe imbricatis, erectiusculis vel subsecundis, obliquis,* ovatis, subacuminatis, nunc acutis nunc obtusis, *margine planis, subserratis, nervo perbrevi nonnunquam furcato instructis, dorso papillosis*; pedicello lævi; capsula ovato-oblonga, cernua; *operculo rostrato, capsulam vix æquante*; calyptra dimidiata glabra; peristomio *Hypni.*
Musci Pyrenaici, 56. *Pterogonium heteropterum,* Bruch in Schwaegr. Suppl. iii. v. 1. t. 210 *b*; *vix Pterigynandrum h.,* Brid. Bryol. Univ. ii. p. 176. *Hypnum catenulatum,* H. et T.! Musc. Brit. ed. 2. p. 160. t. 24; Hook. Eng. Flora, v. P. 1. p. 81; non autem Schwgr. Suppl. 1. v. 1. p. 218; nec *Pterigyn. catenulatum,* Brid. Musc. Rec. ii. P. 1. p. 64. t. 5. f. 4.
Hab. Z_{1-2} ad saxa in sylvis Pyrenæorum centralium, sat frequens sed rarissime fructificans. Prope *B.-de-Bigorre* capsulis onustum legi 17 Octobris, 1845. In Hibernia ad *Powerscourt Waterfall,* ubi primus omnium beatus Taylor detexit. In Angliæ et Scotiæ plurimis locis repertum est. In monte Vogeso et Germania occidentali, teste Bruch, *l. c.*

Cæspites densi, implexi. *Caulis* prostratus, hic illic radicans, varie divisus; divisiones irregulariter pinnato-ramosæ, ramis alternis, ascendentibus, plurimo tempore subsecundis, simplicibus, subramosis, rarius pinnatis. *Folia* caulis divisionumque ovato-acuminata, in summo

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caule acumine sæpius valde elongato, acuta, basi decurrentia et e marginibus inflexis semi-amplexicaulia; "aliorum ramorum erectiuscula, aliorum secunda" (Schwgr.), laxe et subquadrifarie imbricata, alia recta, alia oblique incurva, ovata, ovato-lanceolata et ovato-acuminata, quoad apicem nunc acuta nunc obtusa, margine plana; *omnia* denticulata, nervo perbrevi quartam folii partem ut plurimum emetiente, nunquam ad medium usque producto, nunc lato et obscuro, nunc ramoso vel e basi ipsa bifurcato, instructa; cellulis mediocribus, oblongis, prominulis areolata et dorso valde papillosa; in cæspitibus sterilibus sæpe pallida, flavescentia, in fertilibus autem fere semper saturate viridia. *Florescentia* dioica. *Caules masculi* cum fœmineis immixti, iis tenuiores: *flores* numerosi, alares, ovati, foliis 12 plus minus, ovatis, exterioribus obtusis, internis acuminatis, acumine torquato, enerviis, valde concavis, obscure denticulatis, areolatione laxiori; antheridiis haud copiosis, paraphysatis. *Fœminei floris* folia perichætialia sat numerosa, externa brevissima, interna elongata et flexuoso-acuminata, enervia, subdenticulata, laxe areolata, haud papillosa. *Vaginula* teres, viridis, apice tamen atro-rubens, archegoniis et paraphysibus numerosis perichætium haud æquantibus onusta. *Pedicellus* semuncialis, lævis, rufus. *Capsula* ovato-oblonga, cernua, e brunneo olivacea. *Peristomii externi* dentes 16, trabeculati, linea media exarati, pallidi: *interni* membrana carinato-sulcata, in processus totidem solidos, ciliis binis filiformibus interjectis, ultra medium fissa. *Annulus* duplex, revolubilis. *Operculum* e basi conica rostratum, rostro oblique curvato, capsulam fere æquans. *Calyptra* dimidiata, glabra. *Semina* congenerum.

Ab hoc differt *H. dimorphum*, Brid., *foliis caulis divisionumque primariarum squarrosis*; *ramis dense foliosis, foliis arcte appressis* "unde ramulorum facies teres" (Brid.), *latioribus*, obtusioribus, *nervis binis* tenuioribus et plerumque longioribus, e cellulis brevioribus areolatis, et maxime *operculo conico*.

Obs. I have been thus particular in my description of this disputed moss in the hope of finally settling its name and synonymy. The characteristic figure of Schwaegrichen, though representing a barren specimen, and his description, accurate as far as it goes, place it beyond a doubt that his *Pterogonium heteropterum* is the same plant as the *Hypnum catenulatum* of English authors; but that it cannot be identical with the *H. catenulatum* of Schwgr. will be obvious from the following considerations. The leaves differ from Schwgr.'s description of *H. catenulatum* in being *oblique*, decurrent at the base and slightly embracing the stem, the *margins plane* (by no means "stria utrinque marginali brevi," which implies a decidedly reflexed or recurved margin), *papillose and truly denticulate**, the *nerve very short*, not "ultra medium evanescente." Besides these discrepancies are the very important ones of a *dioicous inflorescence* and a *decidedly rostrate lid*†, not "conicum *brevissimo* rostello."

* The authors of 'Musc. Brit.,' for want of examining with sufficient minuteness, supposed that the denticulation of the margins was only *apparent*, arising from the papillosity of the surface.

† Represented shorter in the 'Musc. Brit.' figure than in my Pyrenæan specimens, and in original ones from the authors.

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Presuming the identity of our plant with the *Pterogonium heteropterum* of Schwaegrichen, and its diversity from the *Hypnum catenulatum* of the same author, to be sufficiently established, I have further to remark that the *Pterigyn. heteropterum* of Brid. *l. c.* is surely a different plant from that of Schwaegrichen; for it has "rami inordinate fasciculati," and "theca erecta oblonga, *omnino Pterigynandri*," to which is added "Inter *P. gracile* et *filiforme* intermedium." These characters point rather to a form of *P. filiforme*, with which species we find Schwaegrichen identifying it, at the close of his description, in these terms: "Hunc muscum propterea pingi curaveram, ut botanicorum curæ commendaretur et fructus completi exquirerentur; sed acceptis nuper a Bridelio speciminibus, illud a *Pt. filiformi* non differre convictus sum." He erred, however, in supposing his moss the same as Bridel's, and consequently a var. of *P. filiforme*, which may be excused him from the circumstance of his possessing only barren specimens.

It still remains to inquire what is the veritable *Hypnum catenulatum* of Bridel and Schwgr.; but I fear this question can only be settled by a reference to the herbaria of these authors. The moss published under that name in Schimper's 'Stirpes Normales,' &c. agrees with Schwaegrichen's description in the "folia obesa et mollia .... stria utrinque marginali brevi," and in the nerve, &c., but the inflorescence is certainly *dioicous*, while Schwaegrichen, whom it is difficult to suppose mistaken on this point, states that of his moss to be *monoicous*. A moss agreeing perfectly with Schimper's has been found by Mr. Ibbotson on Pen-y-ghent in Yorkshire, and the *H. catenulatum* of Drummond's 'Musci Americani,' No. 219, is possibly not specifically distinct. These three mosses are all sterile, and their identification is consequently the more difficult, if not quite impossible. I gathered the same moss in the Pyrenees in numerous stations, extending between the extreme limits of my explorations to the westward and eastward, yet always sterile, which would be inconceivable in a monoicous species distributed over so wide a space. However, rather than propose a new name for it, I am willing for the present to receive it as *H. catenulatum*.

16. *H. catenulatum*, Brid.? Mant. Musc. p. 167; Schwgr.? Suppl. P. 2. p. 218. "*Leskea Vaucheri*, Schimp." M. P. 82.

Hab. $Z_{1\ sup.}$ in saxis arborumque radicibus per Pyrenæos occidentales et centrales, haud raro cum *Leskea attenuata* et *nervosa* sociatum.

I gave this moss in 'Musci Pyrenaici' as *Leskea Vaucheri*, Schimp., from a comparison with specimens under that name in Dr. Montagne's herb. at Paris; but I have since learnt that M. Schimper really intended by *Leskea Vaucheri* the species mentioned in this catalogue as *L. nervosa*, and it is therefore not improbable that the tuft I examined contained both species, for they frequently grow intermixed and are quite similar in habit. Very lately I have received from M. Schimper fertile specimens of *H. catenulatum*; the capsule and operculum are much of the same form as in *H. heteropterum*, and *the processes of*

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the inner peristome are imperforate, not "quatuor lacunis notati," as described by Schwaegrichen.

§ 6. Serpentia.

17. *H. serpens,* L. Sp. Pl. p. 1596; E. Bot. t. 1037; M. P. 60.

Hab. Z_{0-2} in arboribus imis, &c.; in montibus sequente minus frequens.

18. *H. subtile,* Hedw. Musc. Frond. iv. t. 9 (sub *Leskea*); M. P. 61.

Hab. Z_{1-2} ad truncos vetustos, sat frequens; rarius ad rupes. *Forêt de Lhieris; Vallée de Lutour,* &c.

19. *H. Sprucii,* Bruch in litt. (sub *Leskea*); Spruce in Lond. Journal of Botany, iv. p. 180; M. P. 62. *Hypnum confervoides,* Drumm. ! Musc. Amer. n. 190 (*ex parte*): non Bridelii.

Hab. Z_2 P. occ. ♀ in rupium umbrosarum fissuris montis *Lizé* et vallis *Béost*; P. c. ♂ *Vallon de Courbettes* et *Forêt de Lhieris,* cæspitibus *Mnii serrati* immixtum.

The inflorescence of this species is truly *dioicous* *, and from the circumstance of *female plants alone* being found *in the W. Pyrenees,* and *only male plants in the Central,* it may readily be conjectured that no fruit was observed.

§ 7. Tenella.

20. *H. tenellum,* Dicks. Cr. Fasc. iv. t. 11. f. 12; M. P. 25.

Hab. Z_1 in muris rupibusque calcareis circa *Pau* et *B.-de-Bigorre. Mt. Ferrand,* P. or. (Arnott !).

§ 8. Depressa.

21. *H. silesiacum,* P. Beauv. Prodr. d'Æth. p. 70; Schwgr. Suppl. t. 94; M. P. 46. *H. repens,* Poll. palat.; Duby, Bot. Gall. ed. 2. ii. p. 562.

Hab. Z_{1-3} ad truncos putrescentes per Pyrenæos præcipue occidentales.

In the Pyrenees I never observed this species but on rotten wood, but in Dec. 1847 I met with it on soft sandstone in Arncliffe Wood, Eskdale. All the other British specimens I have seen belong to the following species.

22. *H. Mühlenbeckii,* Schimp. ! mst.

Hab. Z_{2-3} in terra rupibusque subhumidis, rarissimum. *Lac de Séculéjo.* Inter pagos *Luz* et *Barèges.*

23. *H. depressum,* Bruch ! in Bot. Zeit. 1824, p. 763. *H. confertum* var. ζ. *depressum,* Brid. Br. Univ. ii. p. 767.

Hab. Z_1 P. c. *Vallon de Serris,* ad rupes calcareas.

* ***Planta mascula*** fœminea tenuior. ***Flores*** sparsi, cauli ramisque solute adhærentes. ***Folia perichætialia*** sub-10, externa minuta, lanceolata, interna ovata brevi acumine, omnia serrata, enervia. ***Antheridia*** 2, ovalia, brevipedicellata, singula paraphysibus 2 stipata.

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This species is abundant in woods *on calcareous soil* near Castle-Howard, but is always sterile.

24. *H. elegans*, Hook. Musc. Exot. t. 9; Schwgr. Suppl. t. 282 *a*. *H. planifolium*, Brid. ? Bryol. Univ. ii. p. 411.

Hab. Z_{1-2} P. c. prope *B.-de-Bigorre*, ad terram (♀); *Bois de Sajust* prope *B.-de-Luchon*, ad rupes graniticas (♀ et ♂).

Mr. Wilson has lately found in Mr. Turner's herbarium fertile specimens of this (gathered near Bantry by Miss Hutchins, but confounded with *H. denticulatum*) which agree in every respect with the original specimen in Herb. Hook. (gathered by Menzies on the N.W. coast of America). He also suggests that *H. planifolium*, Brid., *l. c.*, gathered by Lapylaie near Falaise, is the same species, but there are some discrepancies not easily reconcileable. For instance, our plant has the leaves remarkably deflexed at the apices so as to appear *secund in profile*, whereas Bridel says "folia recta;" but on the whole I admit that it is very probable he had the same species under his eye.

In the *Bois de Sajust* I found male and female plants intermixed. The former are very slender and elongated: the flowers are situated on the stem and the lower part of the branches, those near the base of the stem often fascicled, but the upper usually solitary; they consist of about ten ovato-lanceolate, shortly acuminate, concave leaves, and include about four paraphysate antheridia.

In April 1846 Mr. Borrer and myself gathered *H. elegans* on the sand-rocks in Eridge Park, Tunbridge Wells, and I have since met with it abundantly in the neighbourhood of Castle-Howard, in Eskdale, &c. Perhaps Dr. Taylor was the first who ascertained its existence in the British Isles and clearly distinguished it; Messrs Wilson and Mitten have also found it in several stations. It grows on decaying vegetable matter, on the earth or on rocks, *avoiding only such as are calcareous*, while *H. depressum*, its very near ally, is quite pertinacious in selecting a calcareous matrix. The former differs from the latter chiefly in the *more faintly toothed or quite entire leaves*, their *slenderer points* and closer more chlorophyllose areolation, but especially in the *pendulous capsule*. Both species are dioicous, scarcely ever fruiting, but propagating themselves by slender *deciduous flagelliform ramuli*, which spring from the stem in fascicles. These ramuli are sometimes so numerous as to be alone visible, and being clad with minute distant leaves, they give to the tufts the aspect of drawn-up *H. subtile*.

25. *H. trichophorum*, Spruce in mst. *Leskea pilifera*, Swartz! (ex herb. Smithii). *Neckera p.*, Musc. Pyr. 66. *H. denticulatum* var. *Donnianum*, Drumm.! Musc. Am. n. 165 (*nonnull. exemplorum*): non *H. Donnianum*, Sm.

Hab. Z_2 ad latera scopulorum graniticorum versus terram spectantia, in umbrosissimis vallis *Jéret*, P. occ.

Inflorescence monoicous: flowers fascicled, the male and female in separate fascicles. *Peristome very pale*, especially the outer; the *inner* cloven to ⅔rds of its length: *processes perforated, between the articu-*

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lations, nearly throughout their length: *cilia* none or quite rudimentary.

In 'Musci Pyr.' I placed this moss along with the first section of *Neckera* (*Omalia*, Brid.), to which it approaches very much in habit; but the *Omaliæ* differ from it so essentially in some of their characters, that I feel compelled to withdraw it from their society. *O. complanata* has the capsule very narrow-mouthed, the peristome consequently small and the outer teeth remarkably slender; *the processes of the inner are entire, very slender and fragile, and the basal membrane rises very little above the mouth of the capsule* (so that the moss might be considered a *true Neckera* with as much justice as *N. pumila*, from which I am not certain that it should be separated). The inflorescence is *dioicous*. *O. trichomanoides* has a wider-mouthed capsule; the inner peristome firmer, *reddish*, the basal membrane = $\frac{1}{4}$th of the whole, *the processes deeply carinate but not lacunose*. The inflorescence is *monoicous*, and the flowers are mostly solitary.

Hypnum trichophorum differs from both these, not only in the peristome, but in the *flaccid* irregularly divided *stems*; the *symmetrical leaves*, which are not 4-stichous, nor (as in the *Omaliæ*) so decurved at the apices as to make the branches appear channeled when viewed from below; the *long-necked capsule*; the *conical lid*, &c. In nearly all these characters it is closely allied to *H. denticulatum* and *pulchellum*, both of which have not unfrequently a nearly symmetrical capsule. *H. elegans* is intermediate as to the form of its leaves between *H. denticulatum* and *H. trichophorum*.

It is with great reluctance I change Swartz's specific name, but this is rendered compulsory by the removal of the species into *Hypnum*, where there is already a "*piliferum*." I shall not, however, quarrel with those who are disposed to raise this section into a separate genus, and restore to the species its original name.

26. *H. pulchellum*, Dicks.! Fasc. ii. p. 13. t. 5. f. 6; Herb. Sicc. fasc. ix. n. 22. *H. nitidulum*, Wahl. Fl. Lapp. p. 370; M. P. 63.

Hab. Z_{2-4} ad truncos putridos, in rupium fissuris, &c., P. occ. et c. *V. de Jéret*; *Esquierry*, &c. *En montant au Lac Lehou* (Philippe!).

27. *H. denticulatum*, L. Sp. Pl. p. 1595; Hedw. Musc. Frond. 4. t. 3.

Hab. Z_{0-2} ad ligna putrida. A sequente *florescentia monoica* distinctum.

28. *H. sylvaticum*, L. Syst. Veg. p. 950; Schwgr. Suppl. t. 87; M. P. 64 (ex parte).

Hab. Z_{0-4} ad ligna putrida, in rupibus subhumidis, &c.

When growing in water or in moist places, the leaves of this species often put forth radicles from or near their apices.

29. *H. undulatum*, L. Sp. Pl. p. 1589; Schwgr. Suppl. t. 282; M. P. 65.

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Hab. Z_{2-3} in umbrosis humidiusculis, rarius. *Vallée de Lesponne. Mt. Crabioules.*

§ 9. Rugosa.

30. *H. rugosum,* Ehrh. Dec. n. 291. *H. rugulosum,* H. et T.! Musc. Brit. p. 187. t. 26; M. P. 42.

Hab. $Z_{1\ sup.-2}$ ad saxa calcarea per totos Pyrenæos.

§ 10. Plicata.

31. *H. plicatum,* Schleich. Cent. iv. n. 27; Schwgr. Suppl. 1. P. 2. p. 301; M. P. 6.

Hab. Z_{3-4} ad saxa præcipue granitica in alpinis, plerumque secus ovilia, sociis *Leskea incurvata* et *Tortula aciphylla.* In valle *Arise* P. c. fructif. invenit cl. Philippe!

Paraphylla are present in this species, which completely cover the stem between the leaves with a short felt. The largest are leaflike, though many times smaller than the true leaves, lanceolate or lanceolato-subulate, entire or with one or two teeth near the base. In their more rudimentary form they simulate radicles, being one or more cellules in breadth and slightly and irregularly branched. Hence the species may be considered to have some affinity with *H. filicinum* on the one hand, and with *H. Pyrenaicum* on the other.

§ 11. Adunca.

32. *H. riparium,* L. Sp. Pl. p. 1595; Hedw. Musc. Frond. iv. t. 3.

Hab. Z_1 P. c. in ripis flum. *Adour* prope *Bagnères* (Philippe!).

33. *H. fluitans,* L. Fl. Suec. 1074; Hedw. Musc. Frond. t. 36.

Hab. P. or. in monte *Canigou* (Arnott!). In Pyrenæis nusquam ipse inveni.

34. *H. palustre,* L. Sp. Pl. p. 1593; Eng. Bot. t. 1655; M. P. 37.

Hab. Z_{1-2} in rivulis saxis emersis adhærens.

35. *H. falcatum,* Brid. Musc. Rec. ii. P. 2. p. 63; Schwgr. Suppl. t. 145; M. P. 38.

Hab. Z_2 in scaturiginosis calcareis juxta rivulum *Ruisseau d'Ardalos* dictum, in valle *Lesponne.*—An mera sequentis forma?

36. *H. fluviatile,* Sw. Musc. Suec. p. 63; Hedw. Sp. Musc. t. 81.

Hab. Z_1 P. occ. in rivulis supra pagum *Jurançon*; P. c. in ripis fl. *Adour* prope *Bagnères* (Philippe!). (*Pic St. Loup* prope *Montpellier*: Arnott!)

37. *H. filicinum,* L. Sp. Pl. p. 1590; Hedw. Sp. Musc. t. 76; M. P. 39. *H. conspurcatum,* Brid.! in hb. Requien.

Hab. Z_{1-2} in saxis udiusculis præcipue rivulorum.

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"*Var.* foliis rigidis, nervo crassissimo instructis;" M. P. 40. *H. Vallisclausæ*, Brid. ! Br. Univ. ii. p. 534.

Hab. in fontibus profundis secus ripas flum. *Adour*, in vicinia pagi *Asté*, P. c.

Specimens gathered by Messrs. Arnott and Requien at *Vaucluse* agree well with Bridel's description, and are quite the same as my own from *Asté*. In 'Musci Pyren.' I had considered *H. filicinum* and *fluviatile* not distinct, relying on Bridel's description of the latter (Br. Univ. p. 532), where the *falcato-secund leaves* (rarely seen in *real H. fluviatile*) are strongly insisted on. *H. fluviatile verum* is, however, readily distinguished from *H. filicinum* by the *monoicous inflorescence*.

38. *H. commutatum*, Hedw. Musc. Frond. iv. t. 26.

Hab. Z_{1-2} per Pyrenæos in scaturiginosis calcareis.

Var. alpestre, Schimp. in litt.; P. c. *Vallon d'Arise* (Philippe !) P. or. *Port Nègre* (Arnott !).

39. *H. uncinatum*, Hedw. Musc. Frond. 4. t. 5; M. P. 41.

Hab. Z_{2-3} ad saxa et ligna putrida.

§ 12. Cupressiformia.

40. *H. Crista-castrensis*, L. Sp. Pl. p. 1591; Hedw. Sp. Musc. t. 76; M. P. 43.

Hab. Z_2 in Pyr. centralium sylvaticis, ad cataractam dict. *la Cascade du Cœur* in valle *du Lys*, etiam in valle *Lesponne*; in P. occ. loco *Pont d'Espagne*.

41. *H. molluscum*, Hedw. Musc. Frond. iv. p. 56. t. 22; M. P. 44.

Hab. Z^{0-5} in rupibus arborumque basi.

"*Var. terrestre*, foliis insigniter serratis plerumque striatis;" M. P. 45.

Hab. ad terram in sylvis circa *Pau*, locis *Parc de Pau*, *Bois de Gan*, &c.

In the Pyrenees, this species sports into innumerable forms, sometimes simulating *H. flagellare* in the laxly spreading, scarcely at all secund leaves, which are shorter than ordinary, more sharply serrated and distinctly striated; at other times it puts off the characteristic pectinato-pinnate ramification and assumes the habit of *H. cullichrous*, to which also it approaches in the form of the leaves and their faintly-toothed margins. A small tuft of male plants was gathered in Z_5 (*Port de Cauterets*) growing with *Encalypta rhabdocarpa*.

42. *H. flagellare*, Dicks. Crypt. Fasc. ii. p. 12; H. et T. ! Musc. Brit. t. 25; M. P. 9.

Hab. $Z_{1\ sup.}$ P. c. ad cataractam inter pagum *Labassère* et fontem dict. *la fontaine sulfureuse*: nusquam alias vidi.

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43. *H. pratense,* Koch (fide Bruch); Spruce in Lond. Journ. of Bot. iv. p. 177; M. P. 51.

Hab. Z_1 per totos Pyrenæos, in graminosis montium humiliorum: sterile solum ipse vidi. Ad pedem monticuli *Bédat* prope *B.-de-Bigorre* fructif. invenit cl. Philippe!

44. *H. callichrous,* Brid. Br. Univ. ii. p. 631; M. P. 47.

Hab. Z_{2-4} P. occ. in rup. irroratis ad pontem dict. *le Pont d'Espagne,* non procul a *Cauterets*; P. c. in fauce *la Gorge d'Esquierry* dicta, etiam in montibus *Maladetta* et *Crabioules,* necnon *en montant au Lac Lehou* (Philippe!).

45. *H. incurvatum,* Schrad. Crypt. Gew. n. 80; Schwgr. Suppl. t. 94; M. P. 48.

Hab. Z_1 per Pyr. centr. et occidentales: pulcherrime ad saxa umbrosa prope *Oloron.*

46. *H. resupinatum,* Tayl.! in schedis recentioribus. *H. multiflorum,* ejusd. in Fl. Hibern. P. 2. p. 46; M. P. 49. *H. polyanthos,* E. Bot. t. 1664.

Hab. Z_{0-1} P. occ. ad arbores prope *Pau*; etiam in Agro Syrtico prope Aq. Tarbellicas.

The two localities here cited are the only ones noted in the Pyrenees, but in Britain this species is nearly as frequent as the following.

47. *H. cupressiforme,* L. Sp. Pl. p. 1592; Hedw. Musc. Frond. iv. t. 23; M. P. 50.

Hab. Z_{0-4} passim.

48. *H. Haldanianum,* Grev.! in Ann. Lyc. Hist. Nat. Novi-Eborac. i. p. 275. t. 23 (e specim. a cel. auctore communicatis); Sulliv.! Musc. Allegh. n. 14; M. P. 52. *H. pulchrum,* Drumm.! Musc. Amer. n. 180. *H. cylindricum,* B. et S.!

Hab. $Z_{1\ inf.}$ P. c. ad terram et arborum radices in sylvis siccioribus circa *B.-de-Bigorre* (*Bois de Lagaillaste et d'Asté*).

Inflorescence monoicous: male flowers confined to the stem. The teeth of the outer peristome and the processes of the inner are remarkably attenuated, and the latter (as well as the cilia) are papillose upwards. There is considerable variation in the form of the apex of the leaf: in Sullivant's specimens the leaves are merely *acute*; in Drummond's they are decidedly *acuminate*; and my Pyrenæan specimens are intermediate in this respect.

§ 13. Cuspidata.

49. *H. cuspidatum,* L. Sp. Pl. p. 1595. *H. palustre,* &c., Dill. t. 39. f. 34.

Hab. Z_{0-3} in pascuis rupibusque subhumidis: sterile semper vidi.

50. *H. Schreberi,* Willd. Fl. Berol. p. 325; E. Bot. t. 1621; M. P. 53.

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Hab. Z_{0-3} in umbrosis humidis : in Zona subalpina sola copiosiss. fructificans.

51. *H. purum,* L. Sp. Pl. p. 1594; E. Bot. t. 1599; M. P. 54.
Hab. Z_{0-2} in sylvis, &c.

§ 14. Julacea.

52. *H. julaceum,* Schwgr. in Schultes Reis. &c. (sub *Leskea*); M. P. 55. *H. moniliforme,* Wahl. Fl. Lapp. p. 376. t. 24.
Hab. Z_{2-4} in rupestribus per Pyrenæos, rarius tamen et sterile. *Mont Lizé. Lac de Séculéjo* (♀). *Lac Lehou* (*var.* foliis longius apiculatis). *V. d'Eynes* (Arnott!).—"Folia apiculo minuto plerumque incurvato semper reperi;" Musc. Pyr. *l. c.*

§ 15. Salebrosa.

53. *H. albicans,* Neck. Meth. Musc. p. 180; E. Bot. t. 1300.
Hab. Z_{0-1} in arenosis, rarum. *St. Pandelon. B.-de-Bigorre.*

54. *H. glareosum,* Bruch. ! in litt.; M. P. 29. *H. salebrosum,* H. et T. Musc. Brit. p. 166. t. Suppl. 5 (*ex parte*).
Hab. Z_1 P. occ. ad saxa in valle *Béost;* P. c. in arenosis ad basin monticuli *Bédat,* et in saxosis sylvæ *Bois de Gouerdère* dictæ: loca calcarea amat.

In the *Bois de Gouerdère* this grows intermixed with *H. salebrosum,* from which it is distinguished at sight by its *leaves being paler and more silky, with longer more flexuose points and very faintly toothed margins*; but the most important character is the *dioicous inflorescence.* It is a very abundant species in the neighbourhood of York and Castle-Howard, but is rarely fertile: *it never grows on trees. H. salebrosum* I have seen in England only on trees in woods near Kirkham Abbey, in the vale of the Yorkshire Derwent.

55. *H. salebrosum,* Hoffm. Fl. Germ. ii. p. 74; Brid. Br. Univ. ii. p. 477; Grev.! Scott. Cr. Fl. t. 284; M. P. 30.
Hab. Z_{1-2} P. c. ad saxa et supra ligna putrida circa *Bagnères-de-Luchon,* locis *Bois de Gouerdère* et *Vallée du Lys,* copiose; circa *B.-de-Bigorre,* rarius.

56. *H. campestre,* Bruch ! in litt.; M. P. 31.
Hab. Z_1 in graminosis circa thermas *de Salut* dictas, prope *B.-de-Bigorre.* Inter *H. salebrosum* et *rutabulum* medium.

§ 16. Rutabula.

57. *H. pseudoplumosum,* Brid. Musc. Rec. ii. P. 2. p. 108; M. P. 36. *H. plumosum,* H. et T. ! Musc. Brit. p. 162. t. 25.
Hab. Z_{1-2} in rivulorum saxis: socio consuetissimo *H. populeo.*
Var. (*H. subsphæricarpon,* Schleich. exs. cent. 2. n. 46); in Pyrenæis (Bridel).

58. *H. populeum,* Hedw. Sp. Musc. t. 70; M. P. 27.
Hab. Z_{1-2} ad saxa ex alveo emersa rivulorum.

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59. *H. reflexum,* Starke; W. et Mohr. Bot. Tasch. p. 306 et 476; Schwgr. Suppl. t. 143; M. P. 26.

Hab. Z_3 P. c. in altioribus montis *Crabioules,* saxatile; P. or. *Port Nègre* (Arnott!).

60. *H. Starkii,* Brid. Musc. Rec. ii. p. 167 et Bryol. Univ. ii. p. 595; M. P. 34.

Hab. Z_{2-4} P. occ. ad terram in monte *Lizé,* et juxta pontem dict. *d'Espagne,* socio *H. dimorpho*; P. c. ad rupes argillaceo-schistosas loco *Port de Benasque*! (Arnott!).

The leaves of this species, especially in smaller and fertile specimens, are often subfalcate, and it then approaches very closely *H. paradoxum,* Hook. f. et Wils. (Crypt. Ant. p. 113. t. 155. f. 2), its representative of the southern hemisphere.

61. *H. velutinum,* L. Sp. Pl. p. 1595; Hedw. Musc. Frond. iv. t. 27; M. P. 35.

Hab. Z_{0-3} ad terram, &c. in umbrosioribus.

62. *H. rivulare,* Bruch! in litt.; M. P. 33.

Hab. Z_{1-3} ad rivulorum lapides, P. c. circa *B.-de-Bigorre* (*Forêt de Transoubât,* &c.); P. occ. *Gave de Valentin.*

63. *H. rutabulum,* L. Sp. Pl. p. 1590; Hedw. Musc. Frond. iv. t. 12; M. P. 32.

Hab. Z_{1-3} in terra, &c. fere ubique.

64. *H. illecebrum,* L. Sp. Pl. p. 1594; Schwgr. Suppl. 1. P. 2. p. 255; M. P. 16. *H. blandum,* Lyell! in Hook. Fl. Lond. cum icone.

Hab. Z_{0-1} P. occ. in arenosis inter herbas circa *Pau, St. Sever* et Aquas Tarbellicas; in montes editiores haud ascendens.

65. *H. cæspitosum,* Wils.! E. Bot. Suppl. t. 2878; M. P. 17.

Hab. Z_0 ad arborum radices in pratis irriguis arenaque suffusis prope Aq. Tarbellicas.

§ 17. Prælonga.

66. *H. Teesdalii,* Sm. Fl. Brit. iii. p. 1291; E. Bot. t. 202; M. P. 24. *H. laxepennatum,* Brid.! in hb. Requien (=*H. curvisetum,* Brid. = *Pylaisæa radicans,* Brid.; ex cl. Arnott). *H. Schleicheri* γ. *obscurum,* Brid.? Br. Univ. ii. p. 405.

Hab. Z_1 ad rivulorum exsiccat. lapides, P. c. locis *Elysée Cottin, Labassère,* &c.; P. occ. circa *Gélos.*

67. *H. pumilum,* Wils.! in E. Bot. Suppl. t. 2942; M. P. 23.

Hab. Z_{0-1} P. occ. et centr. in solo calcareo sylvarum, sterile; ♀ prope *Pau* et *B.-de-Bigorre*; ♂ in arenosis prope *Dax.*

68. *H. Swartzii,* Turn. Musc. Hib. p. 151. t. 14. *H. prælongum,* M. P. 22 (*ex parte*).

Hab. Z_{0-1} in terra rupibusque udiusculis.

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69. *H. prælongum*, L. Sp. Pl. p. 1591; Hedw. Musc. Frond. iv. t. 29; M. P. 22 (*ex parte*).

Hab. Z_{0-1} ad terram et truncos, priori multo minus frequens.

70. *H. piliferum*, Schreb. Fl. Lips. p. 91; Hedw. Musc. Frond. iv. t. 14; M. P. 21.

Hab. $Z_{1\ sup.}$ in virgultis, haud frequens: ad cataractam dict. *la Cascade du gros Hêtre* prope *les Eaux Bonnes*, pulcherrime fructiferum. Loca calcarea amat, vix tamen iis proprium.

71. *H. Vaucheri*, Lesquereux! mst.: dioicum; caule prostrato, diviso; *divisionibus* ascendentibus, *apice attenuato decurvo sæpe radicantibus*, irregulariter bipinnatis; *ramulis cuspidatis, subsecundis*; *foliis* suberectis, dense imbricatis, *caulinis ovatis ex apice obtusiusculo longe subulato-acuminatis*, ramulinis lanceolatis in acumen brevius sensim attenuatis, omnibus concavis, *margine inferiori reflexis*, apicem versus *subserratis*, nervo simplici furcatove ad medium evanescente; *pedicello scabro*; *capsula ovata*, inclinata, subcernua; *operculo* inclinato, *conico-acuminato v. subrostrato*, apiee obtuso, *capsulæ dimidium vix excedente*; calyptra dimidiata, glabra; peristomii interni processibus pertusis, ciliis interjectis.—M. P. 19.

Hab. $Z_{1\ sup.-2}$ P. centr. prope *B.-de-Bigorre* in vallibus *Serris* et *Castelloubon*, saxa calcarea dense vestiens; sociis *H. crassinervio* et *Isothecio lutescente*. Hyeme fructificat.—*Var. β. minus* (M. P. 20) in imis truncis saxisque graniticis ad ripas rivuli *Gave du Lys* umbrosissimas, prope *B.-de-Luchon*: nonnisi sterile vidi.

Simile *H. crassinervio*, Tayl., cui tamen sunt *folia breviter acuminata, margine tota reflexa v. explanata, argute serrata, nervo crasso instructa*, capsula longior, *rostrumque operculi duplo longius*. *H. piliferum*, Schreb., *statura majore, divisionibus bifariam pinnatis*; *foliis* laxioribus, majoribus, *caulinis ex apice obtusissimo naviculari longius attenuato-acuminatis* (acumine=¼ fol.) vix serrulatis; *operculo duplo longiori* et peristomio interno minus profunde fisso dignoscendum est. *H. cirrhosum*, Schwgr. Suppl. 1. P. 2. p. 214, habitu *H. Vaucheri* haud absimile, folia iis *H. piliferi* fere longius acuminata habet.

72. *H. tenuicaule*, Spruce: dioicum, ascendens, *parce ramosum*, ramis subdichotomis, subparallelis; *foliis nitidis*, erecto-patulis, *lanceolatis, longe acuminatis, margine inferiori reflexis, vix serrulatis*, nervo folii dimidium raro attingente, nonnunquam obsoleto.

Hab. Z_1 P. c. in arborum radicibus sylvæ *Bois de Lagaillaste* dictæ in vicinia *B.-de-Bigorre*, ♀ sola, sterilis; sociis *H. Haldaniano* et *Isothecio repente*.

Planta pusilla (= *H. incurvatum*), cæspitosa. *Rami* pauci, superiores tamen nonnunquam fastigiati. *Folia* uniformia, flavescenti-viridia, nitida, sicco statu apice patula, areolatione e cellulis parvulis

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elongatis; caulina haud raro nervo perbrevi furcatoque instructa. *Flores fœminei*: folia perichætialia externa minima, rotundata, apiculata; interiora majora, e basi ovato-lanceolata, capillari-acuminata; intima parvula, subulata capillariave; *omnia* enervia, integerrima. Archegonia sub-5, paraphysibus longiora. *Planta muscula* non aderat.

Habitu fere *Isothecii myosuroidis* formæ pusillæ, differt *foliis nitidis, minime argute serratis.* Ab *H. Vaucheri foliis caulinis haud ex obtuso acuminatis et nervo breviori distinctum.*

73. *H. crassinervium*, Tayl.! in Fl. Hibern. Pt. 2. p. 43; Wils.! in E. Bot. Suppl. t. 2706; M. P. 18.

Hab. $Z_{1\ sup.}$ ad rupes calcareas, haud infrequens. *Les Eaux Bonnes*; *B.-de-Bigorre*, &c.

§ 18. Longirostria.

74. *H. murale*, Hedw. Musc. Frond. iv. t. 30; M. P. 15.

Hab. Z_1 ad saxa calcarea.

75. *H. confertum*, Dicks. Fasc. Crypt. iv. p. 17; Schwgr. Suppl. t. 90; M. P. 14.

Hab. Z_{0-1} in saxosis montium humiliorum; in arborum truncis ad rivuli *Luy* ripas prope Aq. Tarbellicas (*forma major*).

76. *H. Megapolitanum*, W. et M. Bot. Tasch. p. 326; Brid. Br. Univ. ii. p. 491.

Hab. Z_0 P. occ. in arenosis prope Aq. Tarbellicas.

77. *H. rusciforme*, Weiss. Crypt. Goett. p. 225; M. P. 13. *H. ripariοides*, Hedw. Musc. Frond. iv. t. 13. *H. atlanticum*, Brid.! in hb. Requien.

Hab. Z_1 in rivulis ad saxa lignaque demersa.

78. *H. longirostre*, Ehrh. Pl. Exsicc. n. 75. *H. striatum*, Schreb.; Hedw. Musc. Frond. iv. t. 13.

Hab. Z_{0-1} locis sylvaticis.

79. *H. striatulum*, Spruce in Musci Pyr. 12: dioicum; *caule prostrato*, diviso; divisionibus subpinnatis, ramis ascendentibus, simplicibus compositisque; *foliis nitidis*, patentibus, caulinis cordato-triquetris, ramulinis cordato-ovatis, *omnibus longe acuminatis, striatis*, margine præter ad basin planis, *serratis, nervo valido paulo ultra medium desinente*; pedicello lævi; operculo e basi convexo-conica rostrato, *capsulam ovali-oblongam subcernuam* subæquante; calyptra glabra.

Hab. Z_1 P. occ. et c. in valle *d'Ossau* et circa *Bagnères-de-Bigorre* (locis *Bédat, Vallon de Serris*, &c.) in saxis calcareis quibus arcte adnascitur. In Pyrenæis Asturiacis invenit Durieu. In Angliæ et Hiberniæ austrinis cl. Wilson, Thwaites et Mitten detexerunt. Ad auctumni finem fructificat.

Caulis prostratus, varie divisus, subpinnato-ramosus, ramis ascendentibus, simplicibus, ramosis vel subpinnatis. *Folia* patentia, cor-

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dato-triquetra (ramulorum cordato-ovata), longe acuminata, plicato-striata, argute serrata, margine utrinque ad basin reflexa superne plana, nervo crasso paulo ultra medium desinente instructa, areolatione mediocri, amœne viridia v. fuscescentia, nitida. *Florescentia* dioica. *Flores masculi* ad caulem et ramos plantæ tenuioris nati; *folia perigonialia* sat numerosa, ovato-acuminata, concava, integerrima, enervia vel rarius quadam nervi umbra prædita; *antheridia* circiter 20, brevi-pedicellata; *paraphyses* illis numerosiores sublongioresque. *Flores fœminei* folio caulino longiores; *folia perichætialia* circiter 17, erecta, *externa* minuta, rotundato-ovata, enervia, *intima* oblonga, in acumen flexuosum, serratum et ad basin nonnunquam inciso-serratum subito attenuata, nervo rudimentario in acumen producto instructa; *archegonia* paraphysibus numerosis stipata. *Vaginula* oblonga, teres. *Pedicellus* uncialis, aut paulo longior, lævis, siccitate dextrorsum contortus. *Capsula* ovali-oblonga, inclinato-subcernua, badia. *Operculum* e basi convexo-conica rostratum, capsulæ longitudine. *Peristomium*: *dentes externi* sedecim, subulato-acuminati, linea media exarati: *interius* membrana pallidior, in processus totidem carinatos et in carina sæpe perforatos, ciliis 2–3-nis, haud ferme fragilibus, interjectis, apice usque ad $\frac{2}{3}$ fissa.

Ab *H. longirostri* quod proximum refert, *statura duplo minori*; *caule prostrato*; *foliis nitidis, longius acuminatis*, minus conspicue striatis, *angulum* 45°–50° *cum ramo efformantibus* (nec ut in *H. striato* fere squarrosis); *capsula breviori, nequaquam horizontaliter cernua*, et peristomio interno profundius fisso, ciliis validioribus, distinguitur.

Obs. Specimens gathered by Mr. Wilson near Killarney have the leaves sometimes more widely spreading, and therefore approach *H. longirostre* more nearly; still the habit is the same as in my Pyrenæan plant, namely very nearly that of *H. velutinoides*, Bruch, which however differs essentially from *H. striatulum* in the rough pedicel and the form of its leaves. Mr. Mitten's specimens, gathered in Sussex, about the roots of trees in a chalky soil, have much of the external aspect of *Isothecium myosuroides*.

80. *H. strigosum*, Hoffm. Deut. Fl. ii. p. 76; M. P. 11. *H. pulchellum*, Hedw. Sp. Musc. t. 68.

Hab. Z_8 P. occ. ad terram in alpinis prope *Cauterets* (*Mont Lizé*; *V. de Combascou*).

†*H. circinatum*, Brid. Mant. Musc. p. 165.

Hab. ad muros prope Burdigalam. Circa Vallem Clausam (Arnott !).

In all probability this species exists also in the Pyrenees, though hitherto not observed there.

Tribus 2. Isotheciaceæ.

2. *Climacium*, W. et Mohr.

81. *C. dendroides*, L. Sp. Pl. p. 1593 (sub *Hypno*); M. P. 90; B. et S. Bryol. Eur. fasc. 16.

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Hab. Z_{0-2} in umbrosis humidis; circa *B.-de-Bigorre* haud raro fertile.

3. *Isothecium,* Brid. Br. Univ. ii. p. 355.

Obs. The four sections into which I divide this genus are separated from each other by such wide intervals, that I shall not be surprised if at some future period they be placed in at least as many different genera. The family of Hypnoid mosses requires to be completely rearranged, and this can only be done well by a person perfectly familiar with exotic species.

Isoth. rufescens is found only on calcareous rock, and its stems are mostly incrusted below with carbonate of lime. *I. lutescens* seems to grow on no other rock than limestone, but it is also occasionally found on trees. The three species of the last section prefer to grow on the living bark of trees, and *I. striatum* selects the slenderest twigs of subalpine shrubs and humble trees.

§ 1. Dendroidea.

82. *I. alopecurum,* L. Sp. Pl. p. 1594 (sub *Hypno*); Schwgr. Suppl. t. 227; M. P. 10.

Hab. Z_1 in rupibus subhumidis, haud vulgare.

83. *I. Myurum,* Pollich, Pl. Pal. iii. n. 1054. f. 8 (sub *Hypno*); M. P. 73. *Hyp. curvatum,* Sw.; H. et T.! Musc. Brit. p. 102. t. 25.

Hab. Z_{0-3} in sylvaticis, ad saxa et arborum truncos.

"*Var.* ramis incrassatis vix curvatis, operculo breviori;" M. P. 74; in rupibus terra obtectis pinetorum circa pontem *d'Espagne* dictum; etiam secus lacum *Séculéjo*.

84. *I. myosuroides,* L. Sp. Pl. p. 1596 (sub *Hypno*); E. Bot. t. 1567; M. P. 75.

Hab. Z_{0-3} in umbrosis præcipue secus rivulos, saxatile et arbustivum.—Folia nonnunquam subsecunda.

§ 2. Sericea.

85. *I. aureum,* Lagasca in Ann. de Cienc. Nat. n. 14 (sub *Hypno*); Brid. Br. Un. ii. p. 469.

Hab. Z_3 P. c. in rupibus prope lacum Espingo, sterile (♀), socia *Tayloria serrata.*

The leaves are incorrectly described by Bridel as nerveless: in my specimens, as in others gathered by M. Schimper in the Sierra Morena, the leaves are (like those of *I. lutescens*) *strongly 3-plicate, the middle fold involving the nerve.*

86. *I. lutescens,* Huds. Fl. Angl. (sub *Hypno*). *H. lutescens,* Hedw. Musc. Frond. iv. t. 16; M. P. 88.

Hab. Z_1 in terra rupibusque calcareis, necnon in arboribus.—Circa *B.-de-Bigorre* (locis *Élysée Cottin, Bois d'Asté,* &c.) capsulis ovato-cylindricis fere erectis ludit.

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The *scabrous setæ*, the *tristriate leaves*, and the whole *habit* of this species bring it so near *I. sericeum*, that in a natural distribution I apprehend they must be placed in the same genus. Besides, if we compare the fructification, we shall not find very great differences. The *capsule* of *I. lutescens* (as above intimated) is sometimes elongated and *very nearly erect*, although never quite symmetrical. The *inner peristome*, as in *I. sericeum* and *Philippianum*, *has the cilia either wholly or in part absorbed at the period of maturity*, although capsules not quite ripe show slender 2–3-nate cilia. (I have observed similar circumstances in *I. polyanthum*.) The chief difference from *I. sericeum* is in the *lacunose processes* and their very slight granulation. The annulus is double. The inner membrane of the capsule projects beyond its mouth the breadth of the annulus before it is divided. The teeth are strongly trabeculate within and enveloped in a delicate membrane.

87. *I. sericeum*, L. Sp. Pl. p. 1595 (sub *Hypno*); M. P. 76. *Leskea s.*, Hedw. Musc. Frond. iv. t. 17.

Hab. Z_{0-2} in arboribus, &c. vulgatissimum.

88. *I. Philippianum*, Spruce in Musc. Pyr. 77: dioicum; caule prostrato, radicante, diviso; divisionibus pinnato-ramosis, ramis erectis, plerumque simplicibus; *foliis* dense imbricatis, *erectis*, *lanceolato-acuminatis*, striatis, toto ambitu minute denticulatis, *nervo percurrente*; *pedicello lævi*, *rarius scabriusculo*; capsula erecta, symmetrica, ovato-cylindrica; operculo breviter rostrato, rostro subcurvato; *calyptra* dimidiata, *glabra*.

Hab. $Z_{1\ sup.}$ P. c. ad saxa calcarea in umbrosis montis *Lhieris*, prope *Bagnères-de-Bigorre*; etiam in rupibus graniticis sylvæ *Bois de Gouerdère* dictæ, prope *B.-de-Luchon*. Auctumno et hyemis initio fructificat.

Plantæ latas plagas efficientes. *Caulis* 2–6 uncias longus, pinnatus, ramis suberectis, simplicibus, rarius furcatis, hic illic radicans et isthinc divisiones pinnato-ramosas edens. *Folia* densa, erecta, superiora nonnunquam (in sicco saltem statu) subsecunda, omnia lanceolata seu ovato-lanceolata, acuminata, acumine caulinorum tenuiori, plicato-striata, toto ambitu minute denticulata, nervo continuo instructa, e cellulis minimis lineari-elongatis areolata, viridia aut auro subnitentia. *Florescentia* dioica: *flores masculos* non habui: *fœminei* cauligeni, elongati, foliis numerosis, 24 et pluribus, erectis, arcte vaginantibus, interioribus acumine setaceo, flexuoso terminatis, leviter plicatis, obsolete nervosis, paraphyses copiosissimas archegoniis longiores complectentibus. *Vaginula* oblongo-cylindrica, viridis. *Pedicellus* uncialis, lævis vel rarius et inferne præcipue scabriusculus, siccitate dextrorsum contortus. *Capsula* erecta, symmetrica, ovato-cylindrica, microstoma, pallida. *Peristomii externi* dentes subulati, quadrangulares, transverse *septati* (haud trabeculati) ad basin versus tantum linea media exarati, sparsim papillosi, pallidi: *interni* membrana profunde (usque ad $\frac{1}{2}$) fissa, lutescens; processibus dentes fere

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æquantibus, lineari-subulatis, solidis, papillis minutissimis opacis obsitis, unde fuligine quasi oblitis, ciliis interjectis nullis seu rudimentariis. *Annulus* e duplici serie cellularum conflatus. *Operculum* breviter rostratum, rostro subinclinato. *Calyptra* dimidiata, glabra, capsulam fere totam obtegens. *Semina* minutissima, minute granulosa.

Ab *Isothecio sericeo nitore minus spectabili*, ramis siccitate vix curvatis, *folii nervo perdurante, pedicello sublævi, calyptra* (*etiam juvenili*) *glaberrima, peristomii dentibus minime* (*I. sericei* instar) e septis in facie externa internaque prominulis *trabeculatis*, notisque aliis differt. Ab *I. lutescente foliis solidinerviis, capsula erecta symmetrica*, ut et peristomii interni configuratione distinguitur.

Tab. II. 1, 2, 3. *folia aucta;* 4. *apex folii magis aucta;* 5. *capsula aucta;* 6. *peristomii pars;* 7. *ejusdem dens externus a latere visus,* 240-*ies auct.;* 8. *dens peristomii* Isothecii sericei *a latere visus, ad id. augm.*

§ 3. Rufescentia.

89. *I. rufescens,* Dicks. Cr. Fasc. 3. t. 8. f. 4 (sub *Hypno*); M. P. 78.

Hab. $Z_{1\ sup.}$ in monte *Lhieris* et juxta aquas dict. *les Eaux Chaudes,* ad rupes calcareas irroratas. In Pyrenæis (Bridel).

90. *I. chryseum,* Schwgr. in Schultes Reise auf den Glockner, ii. p. 364 (sub *Hypno*). *Leskea rufescens β. chrysea,* Brid. Br. Univ. ii. p. 286.

Hab. Z_{2-4} P. occ. et c. in rupium humidarum fissuris. *Col de Louvie. Esquierry. Bois de Sajust.*

This is the moss mentioned in my 'Musci and Hepaticæ of Teesdale' (Trans. ii. 80.) under no. 91, *Hypnum multiflorum,* Tayl., of which, in deference to Dr. Taylor's opinion, I considered it a form. It is however quite distinct from both that species and *I. rufescens,* and is not like the latter confined to calcareous rocks.

§ 4. Polyantha.

91. *I. polyanthum,* Schreb. Fl. Lips. p. 97 (sub *Hypno*); M. P. 79. *Leskea p.,* Hedw. Musc. Frond. iv. t. 2.

Hab. Z_1 P. c. in Tiliæ unicæ trunco juxta thermas oppidi *Bagnères-de-Luchon*; necnon in sepibus prope *Arreau*: rarius.

92. *I. repens,* Brid. Suppl. Musc. p. 131 (sub *Pterigynandro*); M. P. 80; Schwgr. Suppl. t. 27, et t. 246 B (sub *Neckera*).

Hab. $Z_{1\ inf.}$ P. occ. et c. in arborum præsertim Castanearum radicibus circa *Pau* et *B.-de-Bigorre.*

Peristomium duplex: dentes externi pallidi: interius ad basin usque in cilia brunnea, tenuissima, sæpe apice inter se anastomosantia, e cellularum serie singula (rarius ex parte duplici) conflata, fissum.

93. *I. striatum,* Schwgr. Suppl. t. 27 (sub *Pterogonio*) et t. 246 A. (sub *Neckera*); M. P. 81.

Hab. Z_2 P. c. pulcherrime fructiferum in fruticum ramulis ad

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latera montis *Lhieris*, ubi detexerunt cl. Philippe et De Lugo! Sterile infra lacum *Espingo* ipse inveni. *Perist. duplex*, ac in præcedente.

4. *Leskea*, Hedw.

94. *L. nervosa*, Brid. Mant. Musc. p. 128 (sub *Pterigynandro*). *Pt. longifolium*, Schleich.! Cent. 4. n. 8. "*Leskea Frœlichii*, Brid.?;" M. P. 83.

Hab. Z_1 P. occ. et c. in arboribus imis saxisque graniticis, circa *Cauterets* et *Pierrefitte* præcipue. *Bords de l'Adour à B.-de-Bigorre* (Philippe!).

95. *L. incurvata*, Hedw. Sp. Musc. t. 53; M. P. 84. *H. atrovirens*, Dicks. Cr. Fasc. 2. p. 10.

Hab. Z_{3-5} in saxis graniticis præcipue secus ovilia. *Mt. Maladetta, Mt. Lizé*, &c.—Subter nivibus fructus maturat.

96. *L. polycarpa*, Ehrh. Crypt. Exsicc. n. 96; M. P. 85. *Hypnum medium*, Dicks.; H. et T.! Musc. Brit. p. 154. t. 24.

Hab. Z_{0-1} P. occ. et c. in truncis imis secus ripas rivuli *Luy*, prope Aq. Tarbellicas; etiam juxta fl. *Adour, Bagnères*! (Philippe!).

97. *L. rostrata*, Hedw. Sp. Musc. t. 55; Sullivant! Musci Allegh. n. 63; M. P. 86.

Hab. $Z_{1\ sup.}$ in sylvaticis ad rupes inque fruticum radicibus. *Vallon de Serris*; *Superbagnères*, &c.

98. *L. longifolia*, Hartm.! in litt. (sub *Anomodonte*); M. P. 87.

Hab. Z_1 P. c. in *Carpini Betuli* truncis secus rivulum *Gave du Lys*, socia *L. attenuata*; etiam ad saxa in monticulo *Camp de César* dicto prope *B.-de-Bigorre*.

I possess specimens of this gathered by Messrs. Gardener and Scott in Forfarshire.

99. *L. attenuata*, Schreb. Fl. Lips. p. 100 (sub *Hypno*); Hedw. Musc. Frond. i. t. 12; Sullivant! Musci Allegh. n. 61; M. P. 88.

Hab. Z_{1-2} in regione *Fagi sylvaticæ* per totos Pyrenæos, saxa calcarea et truncos veteriores dense obtegens.

100. *L. viticulosa*, L. Sp. Pl. p. 1592 (sub *Hypno*); M. P. 89. *Neckera v.*, Hedw. Sp. Musc. t. 48.

Hab. Z_{0-2} in saxis sylvarum.

I do not think this can be separated generically from *L. attenuata*. The two approach very closely in the form and texture of the leaves: both have the same pallid peristome (internal and external), the only difference being that in the latter the sporular sac extends a little beyond the mouth of the capsule, before it is divided into the processes constituting the inner peristome. In *L. viticulosa* the inner peristome is cloven quite down to the mouth of the capsule, and be-

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sides the slender processes (or rather cilia) there are interposed *ciliola*, but exceedingly short (= about two cellules).

5. *Entodon*, C. Müller in Linnæa, 1844, Band 2. Heft 6.

101. *E. cladorrhizans*, Hedw. Sp. Musc. t. 47 (sub *Neckera*). *Neckera c.*, Sullivant ! Musci Allegh. n. 77. *Isoth. c.*, M. P. 71.
Hab. $Z_{1\ sup.}$ P. c. in ulmo unica ad ripas rivuli dict. *Gave du Lys.*

102. *E. insidiosus*, Mont. ! in Ann. des Sciences Nat. Dec. 1843, tom. 20. t. 15. f. 1 (sub *Isothecio*) ; M. P. 72. *Entodon Montagnei*, C. Müll. l. c.
Hab. $Z_{1\ sup.}$ in terra saxisque calcareis circa *B.-de-Bigorre*, locis *Elysée Cottin, Medous*, &c. : semper absque fructu.

Very soon after my return to England from the Pyrenees, I discovered this beautiful species in several stations around Castle-Howard, growing always in calcareous soil, and often accompanied by *Hypnum recognitum*.

Tribus 3. NECKERACEÆ.

6. *Neckera*, Hedw. (ex parte).

(*Neckera Distichia*, Brid. Br. Univ. 2. p. 238.)

103. *N. crispa*, L. Sp. Pl. 1589 (sub *Hypno*) ; Hedw. Fund. Musc. ii. t. 14 ; M. P. 70.
Hab. Z_{1-2} in rupibus arboribusque passim.

104. *N. pumila*, Hedw. Musc. Frond. iii. t. 20 ; M. P. 69.
Hab. Z_1 P. c. in arborum cortice sylvæ *Forêt de l'Escaladieu* dictæ : nusquam alias vidi.

7. *Omalia*, Brid. Br. Univ. 2. p. 325.

105. *O. complanata*, L. Sp. Pl. p. 1588 (sub *Hypno*). *Leskea c.*, Hedw. Fund. Musc. ii. t. 10. *Neckera c.*, M. P. 67.
Hab. Z_{0-2} in fruticibus præcipue Buxis.

106. *O. trichomanoides*, Schreb. Fl. Lips. p. 88 (sub *Hypno*). *Hypnum tr.*, H. et T. ! Musc. Brit. p. 152. t. 24. *Neckera tr.*, M. P. 68.
Hab. Z_{0-1} in umbrosis humidis ad arborum radices ; haud frequens.

Tribus 4. HOOKERIACEÆ.

8. *Hookeria*, Smith.

107. *H. lucens*, L. Sp. Pl. p. 1589 (sub *Hypno*) ; E. Bot. t. 1902 ; M. P. 91.
Hab. Z_{1-2} P. c. in sylvaticis secus rivulos, rarissima. Circa *B.-de-Bigorre*. *Lac de Séculéjo.*

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Tribus 5. Pterogoniaceæ.

9. *Leptodon*, Web., Tab. Syn. Musc.

108. *L. Smithii*, Dicks. Fasc. ii. p. 10. t. 5. f. 4 (sub *Hypno*).
Hab. Z_{0-1} in arborum cortice circa *Pau*, &c. In Pyr. orientalibus (Arnott ! Montagne !). Circa Burdigalam, socia *Cryphæa heteromalla*, legi.

10. *Pterogonium*, Swartz.

109. *P. filiforme*, Hedw. Musc. Frond. iv. t. 7; M. P. 92.
Hab. Z_{1-3} ad saxa et arbores, circa *Cauterets* præcipue, frequens.
" *Var.* foliis secundis. *P. heteropterum*, Brid.? Br. Univ. ii. p. 176. *Hab.* in rupibus secus lacum *Espingo* prope *B.-de-Luchon*;" M. P. 93.

110. *P. gracile*, L. Syst. Veg. p. 952 (sub *Hypno*); M. P. 94. *Pterigynandrum gr.*, Hedw. Musc. Frond. iv. t. 6.
Hab. Z_{0-2} in saxis Pyrenæorum, semper sterile; in arboribus sylvæ *Lespéron* prope Aq. Tarbellicas Agri Syrtici fructiferum legi 20 Novembris, 1845.

The leaves of this species, besides being *papillose* from the projecting cellules, are *tuberculate on the back in the upper half*; the tubercles arranged with some regularity parallel to the sides of the leaf, three or four cellules apart, and springing from the points where four cellules meet.

111. *P.? subenervium*, Spruce; dioicum; *caule* prostrato, *vage bipinnato*, ramis ascendentibus, subparallelis; *foliis e basi patala apice surrectis, ovatis oblongo-ovatisve, acuminatis*, concavis, *margine inferiori leviter reflexis*, integerrimis, *nervo rudimentario vix ullo, areolatione guttulata.*
Hab. Z_1 in arborum cortice prope *B.-de-Bigorre* et *Pau*: ♀ sola, sterilis.

Caules ½–1 unc., intricati, hic illic radiculos rufos emittentes. *Folia* saturate viridia, integerrima, margine tamen inferiori e cellularum parietibus prominulis subundulata; nervo brevissimo, longitudine latitudinem haud excedente; siccando appressa, apice autem recurva patulave: in ramis tenuioribus nonnunquam adsunt folia angustiora, acumine cirrhoso chlorophyllo carente instructa. *Cellulæ* discretæ; inferiores latitudine tertiam partem long. habent, superiores vix dimidiam; *reflexus vero rotundatæ, minores, unde folium ibidem magis opacum videtur. Flores fœminei* ad caulem et ramos primarios nati; *folia perichætialia*, intimis minoribus *subulatis* exceptis, ovato-lanceolata, acuminata, serrata, *cellulis marginalibus curvatis*, enervia. *Archegonia crassa*, numerosa, 10 circiter, *paraphysibus omnino destituta.*
Folia iis *Pt. gracilis* haud absimilia, *epapillosa autem et apice an-*

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gustiora sunt. Cæterum *ramos nec incurvos nec fasciculatos* habet. *Clasmatodon pusillus*, Hook. et Wils. in Drumm. Mosses of S. States of N. America (*Regmatodon parvulus*, Hampe, Icones, t. 14) habitu et magnitudine ut etiam foliis margine basali reflexis, areolatione guttulata, &c., similis, certe differt *florescentia monoica* et *foliis latioribus ad medium usque nervatis.*

11. *Leucodon*, Schwgr.

112. *L. sciuroides*, L. Sp. Pl. p. 1596 (sub *Hypno*); Schwgr. Suppl. t. 125.

Hab. Z_{0-1} in arborum truncis; copiose fructificans.

12. *Cyrtopus*, Brid. Bryol. Univ. 2. p. 235.

113. *C. curtipendulus*, L. Sp. Pl. p. 1594 (sub *Hypno*). *Anomodon c.*, H. et T.! Musc. Brit. ed. 1. p. 79. t. 22 (1818). *Antitrichia c.*, Brid. Mant. Musc. p. 136 (1819) et Br. Univ. ii. p. 223.

Hab. Z_1 ad saxa et truncos. Fertilem in sylva *Forêt de Transoubât* dicta invenit cl. Philippe!

This species agrees well enough in habit and character with some of the exotic species of *Cyrtopus*, e. g. *C. acuminatus*, Hook. Musc. Exot. t. 151, and I therefore place it along with them rather than in *Anomodon* or *Antitrichia*, both of which genera have been founded on incorrect views of the structure of the inner peristome. The cilia neither spring *from the sides of the teeth*, as stated in 'Muscologia Britannica,' nor are they *opposite to the teeth*, as Bridel says; on the contrary, they are (as in all mosses) *a continuation of the sporular sac*, and they alternate with the teeth. They are the most slender and delicate I have seen in any moss, and consist either of a single series of cellules throughout, or here and there of a double series, when they are often perforated. There are sometimes rudimentary *ciliola* (solitary or twin) between them.

Tribus 6. Fabroniaceæ.

13. *Fabronia*, Raddi.

114. *F. pusilla*, Raddi, Act. Florent.; Schwgr. Suppl. t. 99.

Hab. Pyr. or. prope *Rodez* (Arnott!); etiam "in rupibus cavis ad *St. Martin* in radicibus montis *Canigou*" (Mont. in Arch. de Bot. tom. 1). "Circa *Dax* Aquitaniæ" (Grateloup in Brid. Br. Univ.).

Tribus 7. Anacamptodonteæ.

14. *Anacamptodon*, Brid.

115. *A. splachnoides*, Brid. Mant. Musc. p. 136; Sulliv.! Musci Allegh. n. 82; M. P. 97. *Neckera s.*, Schwgr. Suppl. t. 82.

Hab. $Z_{1\ sup.}$ P. c. *Vallée du Lys*, in trunco *Carpini Betuli* unico.

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Tribus 8. CRYPHÆACEÆ.

15. *Cryphæa,* Brid.

116. *C. heteromalla,* Hedw. Musc. Frond. 3. t. 15 (sub *Neckera*); M. P. 96.

Hab. Z_{0-1} corticicola per Pyrenæos humiliores.

Hemicyclum 2. *Acrocarpi.*

Tribus 9. BARTRAMIACEÆ, Bryol. Europ.

16. *Bartramia,* Hedwig.

§ 1. (= BARTRAMIA, Bridel.)

117. *B. stricta,* Brid. Mant. Musc. p. 116; Br. Europ. *Bartramia,* t. 1.

Hab. P. or. "in Pyrenæis et Monte serrato Hispaniæ, anno 1803" (Bridel, Br. Univ. ii. p. 45); *Concampa,* etiam *au montant de Boulon à Bellegarde* (Arnott!).

118. *B. gracilis,* Floerke in Schrad. Bot. Journ. 1799; M. P. 100. *B. Oederi,* Swartz; Br. Europ. *l. c.* t. 3.

Hab. Z_{1-2} in rupibus umbrosis, haud infrequens.

119. *B. ithyphylla,* Brid. Mant. Musc. p. 116; Br. Europ. *l. c.* t. 2; M. P. 101.

Hab. Z_{2-5} in rupibus graniticis terra obtectis.

120. *B. pomiformis,* Hedw. Sp. Musc. p. 164; Brid. Europ. *l. c.* t. 4; M. P. 102.

Hab. Z_{1-3} in umbrosis, terrestris et rupestris.

Var. *crispa,* M. P. 103. *Bartramia crispa,* Sw. Musc. Suec. p. 73. *Hab.* in rupestribus præcipue subalpinis.

121. *B. Halleriana,* Hedw. Musc. Frond. 2. t. 40; Br. Europ. *l. c.* t. 5; M. P. 104.

Hab. Z_{2-3} ad rupes in regione sylvatica superiore.

§ 2. (= PHILONOTIS, Bridel.)

122. *B. calcarea,* B. et S.! Br. Europ. *l. c.* p. 19. t. 10; M. P. 105.

Hab. Z_{1-3} P. occ. et c. in solo calcareo secus ripas rivulorum vel in scaturiginosis calcareis. *Gélos; Gave de Combascou,* &c. *Tourmalet* et *Cirque d'Arbizon* (Philippe!).

123. *B. fontana,* L. Sp. Pl. p. 1574 (sub *Mnio*); Br. Europ. t. 9; M. P. 106.

Hab. Z_{0-4} in humidis.

124. *B. marchica,* Hedw. Musc. Frond. 2. t. 39 (sub *Mnio*); Br. Europ.! *l. c.* t. 8.

Hab. Z_{1-2} P. occ. *Vallée de Béost,* sterilis; P. c. *B.-de-Bigorre, sur la route de Toulouse,* fertilis (Philippe!).

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Tribus 10. Oreadeæ, Br. Europ.

17. *Catoscopium,* Bridel.

125. *C. nigritum,* Dicks. Cr. Fasc. 3. p. 9 (sub *Bryo*); Br. Europ. *Catoscop.* (cum icone); M. P. 99.

Hab. Z_2 P. occ. *Mont Lizé,* in paludosis secus rivulos.

Tribus 11. Georgiaceæ.

(*Tetraphideæ,* Br. Europ.)

18. *Georgia,* Ehrh. Hann. Magaz. 1780, p. 931.

(*Tetraphis,* Hedw. Fund. Musc. 2. p. 87.)

126. *G. pellucida,* L. Sp. Pl. p. 1574 (sub *Mnio*). *G. Mnemosyne,* Ehrh. *l. c.*; C. Muell. Synops. Musc. p. 182. *Tetraphis pellucida,* Hedw.; Br. Europ. *Tetraphis* (cum ic.); M. P. 319.

Hab. Z_{0-2} ad ligna putrida.

127. *G. Browniana,* Dicks. Crypt. Fasc. 4. p. 7. t. 10. f. 6 (sub *Bryo*); C. Muell. Synops. Musc. p. 181. *Tetrodontium Brownianum,* Schwgr. Suppl. t. 128.

Hab. Z_2 P. c. locis occultis ad rupes arenaceas, &c. præprimis ferro oxydatas: rara et semper *Campylostelio saxicola* consociata. *Labassère. V. de Castelloubon.*

Tribus 12. Bryaceæ.

(*Bryaceæ* et *Mielichoferieæ,* Br. Europ.)

19. *Mielichoferia,* Hornsch. et Nees.

128. *M. nitida,* H. et N. Br. Germ. P. 2. § 2. p. 183. t. 41; Br. Europ.! *Mielichof.* (cum ic.); M. P. 98.

Hab. Z_{1-4} P. occ. et c. in rupibus argillaceo-schistosis, locis *Gorge de Cauterets* et *Port de Bénasque.* P. or. *Crabère* (Arnott!); in convalle *Eynes* (Montagne, *l. c.*); in valle *de Lio* (Thomas in Br. Europ.).

20. *Bryum,* Dillenius.

§ 1. (= Stenobryum, Wils. in litt.)

129. *B. pyriforme,* L. fil. (sub *Mnio*); Br. Europ. *Bryum,* t. 18.

Hab. $Z_{1\ sup.}$ P. c. locis *route de Bagnères à Gazos* et *bords de la route de Toulouse,* ubi invenit am. Philippe!

§ 2. Elongata.

130. *B. acuminatum,* Hoppe et Hsch. Bot. Zeit. 1819, p. 94 (sub *Pohlia*); Br. Europ.! *l. c.* p. 21. t. 6; M. P. 107.

Hab. Z_{2-4} in rupibus terra obtectis Pyr. centralium. *Esquierry. Lac d'Espingo. En montant au Lac Lehou* (Philippe!).

Var. *β. minus,* Br. Europ. *l. c.*; M. P. 108. *Pohlia minor,* Schleich.; Schwgr. Suppl. t. 64.—*Hab.* ad viarum cavarum la-

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tera in regione sylvatica. P. occ. *Gorge dè Cauterets*; *Pont d'Espagne.* P. c. *Chaos de Gavarnie.*

Florescentia haud semper *monoica*; nonnunquam *hermaphrodita* est, et in tali re *sterilis*; quandocunque autem *dioica* invenitur tunc plerumque *fertilis*!

131. *B. polymorphum,* H. et H. Bot. Zeit. 1819, p. 95 (sub *Pohlia*); Br. Europ.! *l. c.* p. 25. t. 8; M. P. 109.

Hab. Z_2 terrestre in abiegnis juxta pontem dict. *d'Espagne.*

Var. *curvisetum,* Br. Europ. *l. c. Pohlia curviseta,* H. et H. *l. c.* p. 98.—*Hab.* Z_{3-4} *V. de Combascou. Esquierry. Port de Bénasque.* In P. or. locis *Mt. Canigou* et *Vallée d'Eynes* detexit cl. Arnott!

132. *B. elongatum,* Dicks. Crypt. Fasc. 2. p. 8; Br. Europ.! *l. c.* p. 32. t. 10.—Var. 1, M. P. 110.

Hab. Z_{1-3} ad vias cavas, in rupibus terra obtectis, &c., per totos Pyrenæos sylvaticos.

"Var. 2. foliis angustissimis, *peristomio interno perfecto.* Ad *Br. elongatum* γ. *macrocarpum,* Br. Europ. accedit." M. P. 111. —*Hab.* ad pinorum truncos cariosos in monte *Crabioules.*

"Var. 3. foliis brevioribus, capsulis longioribus, peristomii interni *ciliis subnullis.*" M. P. 112.—*Hab.* circa *B.-de-Luchon* in sylvaticis editioribus, terrestre, locis *Bois de Sajust, Lac de Séculéjo,* &c.

133. *B. longicollum,* Sw. Musc. Suec. pp. 49, 99. t. 6; M. P. 133.

Hab. Z_2 P. c. in rupium fissuris juxta lacum *Séculéjo.*

134. *B. crudum,* Schreb. Fl. Lips. p. 83; Br. Europ. *l. c.* p. 37. t. 13; M. P. 114.

Hab. $Z_{1\ sup.-4}$ in rupibus montium humiliorum, frequens: rarius in alpes ascendens (*Port de Bénasque*).

§ 3. Nutantia.

135. *B. nutans,* Schreb. Fl. Lips. p. 81; Br. Europ. *l. c.* p. 34. t. 12; M. P. 115.

Hab. Z_{0-4} ad terram in sylvis, nec non in alpinis.

136. *B. Ludwigii,* Spreng. var. β. *gracile,* Bryol. Europ. *l. c.* p. 39. t. 14; M. P. 119.

Hab. Z_4 P. c. in vicinia molium glacialium montis *Crabioules*; secus ripas lacus *Lehou* (Philippe!).

137. *B. albicans,* Wahl. in Web. et Mohr Ind. Musæi. *B. Wahlenbergii,* Schwgr.; Br. Europ. *l. c.* p. 44. t. 17; M. P. 118.

Hab. (*forma typica*) Z_1 ad rivulorum ripas circa *Gélos,* P. occ.: rarius.

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Var. *glaciale,* Br. Europ. *l. c.* *Bryum glaciale,* Schleich. in Brid. Br. Univ. i. p. 852.

Hab. Z_4 P. c. in eodem loco ac *B. Ludwigii* β. P. or. *V. d'Eynes* (Arnott!).

138. *B. carneum,* L. Sp. Pl. p. 1587; Br. Europ. *l. c.* p. 43. t. 16; M. P. 116.

Hab. Z_1 P. c. in rivulorum glareosis circa *B.-de-Bigorre*: rarius.

139. *B. Tozeri,* Grev. Scot. Crypt. Fl. t. 285; M. P. 117.

Hab. $Z_{0-1\ inf.}$ P. occ. in argillaceo-arenosis circa *Pau* et *St. Sever*; in rupibus ophiticis *Sti. Pandelon* prope Aq. Tarbellicas. Auctumno et vere fructificat.

§ 4. JULACEA.

140. *B. julaceum,* Smith, Fl. Brit. p. 1357; H. et T.! Musc. Brit. p. 197. t. 28; Schwgr. Suppl. t. 195; M. P. 120.

Hab. Z_2 P. c. ad rupes humectas juxta cataractam dict. *la Cascade du Cœur*: nusquam alias visum.

141. *B. concinnatum,* Spruce in Musc. Pyr. n. 121: dioicum, *gracilescens,* parce ramosum; *caule ramisque tereti-julaceis*; foliis nitidis, erectis, imbricatis, ovatis et ovali-lanceolatis, *breviter apiculatis,* concavis, integerrimis vel sub apice obsolete denticulatis, anguste areolatis, *margine planis, nervo cum apice evanido.*

Hab. Z_1 P. occ. in rupibus humidiusculis ad viam quæ ducit a pago *Pierrefitte* ad opp. *Cauterets*; P. c. in via cava ad pedem montis *Superbagnères* prope *B.-de-Luchon.*—In Anglia ad cataractam *Caldron Snout* dictam fl. *Tees,* mense Julio, 1843, detexi. —Planta ♀ sola, sterilis, hucusque observata.

Pusillum, cæspitosum; cæspites in parte inferiori tomento radiculoso cohærentes. *Caulis* ½–1 unc. erectus vel ascendens, julaceus, e basi ipsa uno eodemque modo foliosus, ramos nonnullos teretes plerumque simplices, inferiores sæpius fastigiatos proferens, inferne rubellus, superne viridis. *Folia* erecta, imbricata, ovata v. ovali-lanceolata, apiculo brevi subreflexo, concava, alis basilaribus inflexis, margine ipsa plana, integerrima, rarius ad apicem versus obsolete denticulata, nervo percurrente instructa, e cellulis elongato-rhomboideis-hexagonisve minoribus curvulis, superne arctius, basi cellulis latioribus laxius, areolata, inferiora paulo longiora fuscescentia, superiora pallide viridia nitida. *Flores fœminei* terminales seu pseudoalares; *folia* erecta, elongato-lanceolata, subplana, interiora minora; *archegonia* et *paraphyses* numerosi, pari longitudine.

Differt *B. julaceum,* Smith, statura majori, *foliorum apice obtusiori subinflexo, nervo ante apicem evanido,* areolisque angustioribus; *B. atropurpureum* gemmiparum (= *B. gracilentum* Tayl. olim) *foliis erecto-patulis, brevioribus, apiculo obtuso* quasi truncato terminatis, e cellulis minus elongatis conflatis; *B. Funkii,* Schwgr., *foliis nervo validiori excurrente instructis, areolisque multo majoribus*; *B. Blindii,*

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Schimp., *foliis evanidinerviis*; *B. semiovatum*, Brid., foliis *nervo crasso apicem excedente*.

Obs. In foliorum superiorum axillis nonnunquam adsunt gemmæ fasciculatæ (2–9-natæ) saturate purpurascentes, folia minuta arcte imbricata sistentes, iis *B. julacei* haud absimiles.

§ 5. Argentea.

142. *B. argenteum*, L. Sp. Pl. p. 1586; Br. Europ. *l. c.* p. 78. t. 41.

Hab. Z_{0-1} in ruderatis, muris, &c.

143. *B. Zierii*, Dicks. Crypt. Fasc. i. t. 4. f. 10; Br. Europ. *l. c.* p. 29. f. 9; M. P. 122.

Hab. Z_{2-3} in rupibus humidiusculis. P. c. *Lac de Séculéjo*; *Labassère*, &c. P. or. *Mont Louis* (Arnott !).

§ 6. Cæspiticia.

144. *B. pallens*, Sw. Musc. Suec. p. 47. t. 4; Br. Europ. ! *l. c.* p. 68. t. 33; M. P. 123. *B. turbinatum*, H. et T. ! Musc. Brit. p. 202. t. 29.

Hab. Z_{1-3} in humidis præcipue secus rivulos, frequens.

145. *B. pallescens*, Schwgr. Suppl. t. 75; Br. Europ. ! *l. c.* p. 51. t. 22; M. P. 124.

Hab. Z_{2-3} plerumque secus rivulos, haud rarum. *Les Eaux Chaudes*; *Chaos de Gavarnie*; *Lac Lehou* et *Pic du Midi* (Philippe !), &c. In tugurii pastoricii tecto ad latus orientale montis *Tourmalet*.

146. *B. bimum*, Schreb. Fl. Lips. p. 83; Br. Europ. *l. c.* p. 50. t. 21.

Hab. Z_2 P. or. *Vallée d'Eynes* (Arnott !).

147. *B. cirrhatum*, H. et H. Bot. Zeit. 1819, p. 70; Br. Europ. fasc. 32. p. 8. t. 11.

Hab. Z_{3-4} in humidis graminosis P. c., locis *Esquierry* et *Port de Bénasque*.

148. *B. inclinatum*, Sw. Musc. Suec. p. 45 et 96 (sub *Pohlia*); Br. Europ. ! *Bryum*, p. 17. t. 3; M. P. 125.

Hab. Z_{1-2} ad terram saxaque, sed rarius. P. occ. circa *Cauterets*. P. c. *V. de Lesponne*. P. or. *Cambrédazes* (Arnott !).

149. *B. cernuum*, Hedw. Sp. Musc. p. 58. t. 9 (sub *Cynontodio*); Br. Europ. *l. c.* p. 14. t. 1.

Hab. Z_{1-4} ad saxa, rarius. P. occ. *Oloron*. P. c. prope pagum *Luz*; *Pic du Midi à* 1300 *toises* (Philippe !).

150. *B. cæspiticium*, L. Sp. Pl. p. 1586; Br. Europ. *l. c.* t. 34.

Hab. Z_1 P. occ. prope *Oloron*, ubi *cæspitem unicum* inveni ! !

? Var. γ. *imbricatum*, Br. Europ. *l. c.* p. 70. t. 35; M. P. 126. —*Hab.* ad muros in valle *Campan* juxta *Ste. Marie*, sterile.

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151. *B. erythrocarpon,* Schwgr. Suppl. t. 70.
Hab. Z_1 P. occ. supra pagum *Jurançon,* in solo arenoso juxta rivulum.

152. *B. atropurpureum,* W. et M. Ind. Mus.; Br. Europ. *l. c.* p. 73. t. 37; M. P. 127.
Hab. Z_{0-1} in muris, ad terram, &c., vulgatum.

153. *B. alpinum,* L. Mant. 2. p. 309; Br. Europ. *l. c.* p. 76. t. 39; M. P. 128.
Hab. $Z_{1\ sup.-3}$ in saxis secus rivulos: fructiferum juxta thermas supra pagum *Penticosa* Aragoniæ, etiam in faucibus dict. *Gorge de Luz* et *Gorge de Labassère.*

154. *B. pseudotriquetrum,* Hedw. Musc. Frond. 3. t. 7 (sub *Mnio*); Br. Europ. *l. c.* p. 54. t. 24; M. P. 129. *B. ventricosum,* Dicks.; H. et T.! Musc. Brit. p. 205. t. 30.
Hab. $Z_{1\ sup.-3}$ in rupibus humidis, frequens.

155. *B. turbinatum,* Hedw. var. γ. *latifolium,* Br. Europ.! *l. c.* p. 65. t. 32; M. P. 130. *B. Schleicheri,* Schwgr. Suppl. t. 73.
Hab. Z_{3-5} ad fontes in alpinis. *Penticosa; Lac de Séculéjo; Mt. Maladetta,* &c. *Vallon d'Arise* (Philippe!).

§ 7. Capillaria.

156. *B. obconicum,* Hornsch.; Bryol. Europ.! *l. c.* p. 59. t. 27; M. P. 131.
Hab. Z_1 P. occ. et c. ad muros, haud infrequens. *Jurançon; Bagès; Arreau,* &c. *Bagnères* (Philippe!).

157. *B. platyloma,* Schwgr. Suppl. 1. P. 2. p. 116. t. 76 (non Br. et Sch.); M. P. 132.
Hab. Z_1 P. c. in rupibus humidiusculis prope pagum *Pierrefitte.*

This plant agrees closely with Schwaegrichen's figure and description above-cited, with the sole exception that the stems are rather more elongated. Through the favour of Mr. Wilson I have examined specimens gathered in the Canary Islands by Mr. Webb, and named "*Br. platyloma,* Schwgr." by Dr. Montagne: these agree in all characters of importance with the Pierrefitte plant. The latter differs essentially from the *B. platyloma* of B. and S. (*B. Donnianum,* Grev.) in the leaves having *a broad margin of* 4–6 *rows of cellules* ("in sex circiter series digestæ," Schwgr. *l. c.*), but composed of *only a single layer*; while those of *B. Donnianum* have a margin *only* 2 *or* 3 *cellules in width,* but *decidedly thickened* ("margine e strato *duplici* cellularum . . . . circumducta," Br. Europ.), in other words they are *pachylomatous* but not *platylomatous.* The leaves of the true *B. platyloma* differ further in being *far smaller, rigid, nearly erect,* by no means "in comam patulam congesta" (as represented in 'Bryol. Europæa,' but not in Schwaegrichen), the strong nerve running out into a point

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which equals ⅓ or ½ of the rest of the leaf, while those of the 'Bryol. Europæa' plant "n'offrent ordinairement qu'une pointe courte, formée par le rapprochement des bords de la feuille." In habit the two plants differ very considerably.

There is still one doubt remaining, namely whether *B. platyloma*, Schwgr., and *B. obconicum*, Hornsch., be merely forms of one and the same species. There is some difference in external aspect, and the latter has the leaves *scarcely marginated*, paler and less rigid, with a longer-necked, *perfectly symmetrical* and usually more pendulous capsule.

158. *B. torquescens*, B. et S. Br. Europ. *l. c.* p. 49. t. 20; M. P. 133.

Hab. Z_{0-1} P. occ. ad terram prope *Jurançon* et *Cauterets*.—Circa *Montpellier* (Arnott !).

"Var. florescentia *monoica*;" M. P. 134. *B. fuscescens*, nob. in hb.—*Hab.* Z_{0-1} P. occ. prope *St. Sever* in Agro Syrtico, loco *Landes de Mugriet*, in terra arenosa; etiam in muro prope *Oloron*.

(*Descr.* varietatis.) *Plantæ* gregariæ. *Folia* fuscescentia, *subpatula*, siccando appressa *parum tortilia*, elongato-obovata, apiculata, nervo tenui excurrente cuspidata, concava, *haud carinata*, 2–3 cellularum angustiorum seriebus marginata, apice denticulata. *Flores fœminei constricti*, 6–8 folii. *Flores masculi gemmiformes ad fœminei basin nati*, sessiles vel in innovationibus terminales (rarius in planta propria); *folia perigonialia* sub–6, conniventia, exteriora ovato-acuminata, interiora minora, late-ovata, apiculata, antheridia numerosa paraphysibus numerosis sublongioribus stipata, complectentia. *Capsula* in pedunculo basin versus geniculato arcuatove subpendula, elongato-pyriformis, fere clavata, e fusco purpurascens. *Operculum* convexum, apiculatum, aurantiacum, nitens. *Peristomium*: externi dentes pallidi; *internum* membrana in processus carina valde pertusos *apice attenuatos*, ciliis 2–3-nis appendiculatis interjectis, fere ad medium fissa. *Annulus* latus, compositus. *Sporæ* olivaceæ.

The *monoicous inflorescence* is so constant a character in all the individuals from the two localities above-cited, that I am led to suppose this will prove a distinct species. In the typical form of *B. torquescens*, from Jurançon and Cauterets, the fertile flowers are all *hermaphrodite*, and quite *turgid* from the *numerous antheridia* they enclose along with the archegonia. Yet a minute comparison of all the other parts does not reveal any marked difference in the two plants, and I prefer waiting for further evidence before I undertake to decide on their being distinct or otherwise.

159. *B. capillare*, Hedw. Sp. Musc. p. 182; Br. Europ. *l. c.* p. 60. t. 28.

Hab. Z_{0-4} "Var. 1." M. P. 135 (=*B. capillare* α. Br. Europ.): in planitie et montibus humilioribus, fere ubique ad saxa, &c.

"Var. 2. foliis longioribus, obovato-lanceolatis, siccitate patulis vix tortilibus (minime *spiraliter* tortis), capsulis elongatis

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pallidis;" M. P. 136.—*Hab.* Z_{2-3} ad truncos putrescentes locis *Pont d'Espagne, Hourquette d'Aspin, Lac de Séculéjo,* &c.

"Var. 3." M. P. 137 (=*B. capillare* β. *cochlearifolium,* Brid. Br. Univ. 1. p. 666=*B. capillare* η, Br. Europ.).—*Hab.* Z_{3-4} in alpinis, saxatile et terrestre, rarissime fertile. P. occ. *V. de Combascou.* P. c. *Lac Lehou; Esquierry.* P. or. in monte *Canigou* (Arnott !).

160. *B. Donnianum,* Grev.! in Linn. Soc. Trans. 15. p. 345. t. 3. f. 6. *B. platyloma,* Br. Europ. *l. c.* p. 58. t. 26 (non Schwgr.). *B. Muelleri,* M. P. 138.

Hab. Z_0 in terra arenosa Agri Syrtici prope *St. Sever,* sterile.

I published this in 'Musci Pyrenaici' as *B. Muelleri* mst., feeling convinced that it was perfectly distinct from the *B. platyloma* of Schwgr. (See above, under No. 157, for an exposition of the differences of the two species.) I owe to Mr. Mitten the suggestion that it is in reality the *B. Donnianum* of Greville, which we have since confirmed by an examination of the author's original specimens. The fertile plant has been found in Sussex by Messrs. Mitten and Jenner.

161. *B. roseum,* Schreb. Fl. Lips. p. 84; Br. Europ. *l. c.* t. 25; M. P. 139.

Hab. Z_1 in sylvis, plerumque sterile. Fertile in sylva *Bois de Gerde* dicta (Philippe !).

21. *Mnium,* Dillenius, Linnæus.

162. *M. spinosum,* Voit in Sturm. Flor. Germ. Crypt. 11. t. 16 (sub *Bryo*); Br. Europ. fasc. 5, *Mnium,* p. 26. t. 6; M. P. 140.

Hab. Z_2 P. c. sub abietum umbra juxta pontem *Pont d'Espagne* dictum.

163. *M. spinulosum,* B. et S.! Br. Europ. fasc. 31. p. 4. t. 4.

Hab. Z_2 P. c. cum priore; etiam in trunco carioso *V. du Lys.*

164. *M. hornum,* L. Sp. Pl. p. 1576; Br. Europ. fasc. 5. p. 22. t. 4.

Hab. Z_{0-2} in sylvis, haud vulgatum.

165. *M. serratum,* Schrad. Spic. Fl. Germ. p. 71 (sub *Bryo*); Br. Europ. *l. c.* p. 24. t. 5.

Hab. Z_{1-2} in umbrosis præcipue secus rivulos. *Les Eaux Bonnes,* &c. *En montant au Lac Lehou* (Philippe !). *V. d'Eynes* (Arnott !).

166. *M. lycopodioides,* Br. Europ. fasc. 31. t. 2. (An *Bryum lycopodioides,* Hook. in litt. ad Schwgr. ?)

Hab. Z_2 P. c. *Vallon de Courbettes* (Philippe !).

167. *M. orthorhynchum,* Br. Europ. fasc. 5. p. 25. t. 5 (non Bridel).

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Hab. Z_{1-2} P. occ. et c.: socio *M. serrato*. *Les Eaux Bonnes. Col de Louvie. Vallon de Courbettes,* etiam *en montant au Lac Lehou* (Philippe !).

168. *M. undulatum,* Hedw. Sp. Musc. p. 195; Br. Europ. *l. c.* p. 20. t. 3.

Hab. Z_{0-1} in umbrosis: fertile circa *Dax* (Grateloup !), *Pau* (Southby !) et *B.-de-Bigorre* (Philippe !).

169. *M. affine,* Bland. Musc. Exs. fasc. 3. n. 153; Br. Europ. *l. c.* p. 30. t. 9.

Hab. Z_1 locis umbrosis humidiusculis: fertile prope *B.-de-Bigorre* (Philippe !).

170. *M. medium,* B. et S. ! Br. Europ. *l. c.* p. 32. t. 12; M. P. 142 (*forma major*).

Hab. Z_2 P. c. in saxosis umbrosis secus rivulos sylvæ *Bois de Gouerdère* dictæ prope *B.-de-Luchon.*

171. *M. rostratum,* Schrad. Spicil. p. 72 (sub *Bryo*); Br. Europ. *l. c.* p. 27. t. 7; M. P. 143.

Hab. Z_1 ad latera viarum cavarum.

172. *M. cuspidatum,* Hedw. Sp. Musc. p. 192. t. 45; Br. Europ. *l. c.* p. 29. t. 8.

Hab. Z_1 in sylvaticis humidis, rarius. *Jurançon. V. du Lys.*

173. *M. punctatum,* Schreb. Fl. Lips. p. 85 (sub *Bryo*); Br. Europ. *l. c.* p. 19. t. 2; M. P. 144.

Hab. Z_{1-2} in scaturiginosis.

174. *M. stellare,* Hedw. Sp. Musc. t. 40; Br. Europ. ! *l. c.* p. 33. t. 13; M. P. 145.

Hab. Z_{1-2} P. occ. et c. supra ligna putrida inque saxosis umbrosis montis *Goursi* prope *les Eaux Bonnes*; nec non in valle *du Lys* et circa *B.-de-Bigorre*: rarissime fructiferum.

† "*M. latifolium,* foliis ovato-subrotundis solidinervibus marginatis subdenticulatis concavis, caule longo subsimplici.

" Lectum est a Schleichero in Helvetia, missum e Pyrenæis; sine flore.

" Foliorum forma *punctato* aliquo modo simile, si madet; sed habitu et foliis erecto-incumbentibus, siccitate parum plicatis, distinctum. Locum hic habet propter foliorum texturam, Mnio similem." Schwgr. Suppl. 1. P. 2. p. 138.

Very probably this is nothing more than a sterile form of *B. punctatum,* such as I have myself gathered in the Vallée de Lutour, remarkable for its elongated stems and appressed leaves when dry: hence resembling externally *M. cinclidioides,* Blytt.

22. *Aulacomnion,* Schwgr.

175. *A. androgynum,* L. Sp. Pl. p. 1574 (sub *Bryo*); Br. Europ. *Aulacomnion,* p. 11. t. 4; M. P. 146.

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Hab. Z_1 in rupibus umbrosis, rarum. P. occ. *Gave de Gabas.* P. c. *Forêt de Transoubât* (Philippe !).

176. *A. palustre,* L. Sp. Pl. p. 1574 (sub *Bryo*); Br. Europ. *l. c.* p. 9. t. 3.

Hab. Z_1 in paludosis. P. c. prope *Bagnères* (Philippe !). P. or. *Mt. Canigou* (Arnott !).—Plantam per Europam septentrionalem *vulgatissimam* nusquam in Pyrenæis loco natali conspicere mihi contigit !

23. *Timmia,* Hedwig.

177. *T. Megapolitana,* Hedw. Musc. Frond. i. p. 83. t. 31; Br. Europ. *Timmia,* t. 1.

Hab. Z_3 P. c. *Pic du Midi de Bigorre* (Philippe !). P. or. *Mt. Canigou, Mt. Cady* et *Cambrédazes* (Arnott !).

178. *T. austriaca,* Hedw. Sp. Musc. p. 176. t. 42; Br. Europ. *l. c.* t. 2.

Hab. "in Pyrenæis" (Bryol. Europ.).—Planta mihi haud obvia.

Tribus 13. POLYTRICHACEÆ, Bryol. Europ.

24. *Polytrichum,* Dillenius.

§ 1. (= CATHARINEA, *Ehrh.* = ATRICHUM, *P. Beauv.*)

179. *P. undulatum,* L. Sp. Pl. p. 1530 (sub *Bryo*); M. P. 300; Br. Europ. *Atrichum,* p. 8. t. 1, 2.

Hab. Z_{0-3} in umbrosis humidiusculis.

180. *P. angustatum,* Hook. Musci Exot. t. 50; M. P. 301; Br. Europ. *Atrichum,* p. 9. t. 3. *Catharinea a.,* Brid.; Sulliv. ! Musci Allegh. n. 118.

Hab. Z_{0-1} P. c. in collibus siccis dumetosis sylvæ *Bois de Lagaillaste* dictæ prope *B.-de-Bigorre.* P. occ. locis similibus *Sti. Pandelon* prope *Dax.*

§ 2. (= OLIGOTRICHUM, *DeCandolle.*)

181. *P. hercynicum,* Hedw. Musc. Frond. i. t. 13; M. P. 302; Br. Europ. *Oligotrichum,* t. 5.

Hab. Z_{3-4} P. c. in regione inferalpina montis *Crabioules,* terrestre; in alpinis juxta lacum *Lehou* et supra pagum *Gazos* (Philippe !).—? "*Dax,* dans les endroits tourbeux." (Thore in Fl. Franç.)

§ 3. (= POGONATUM, *Pal. Beauv.*)

182. *P. nanum,* Hedw. Musc. Frond. i. t. 13; M. P. 303; Br. Europ. *Pogonatum,* p. 5. t. 7.

Hab. Z_{0-1} ad aggeres arenosas subhumidas.

The *obscurely toothed* (not sharply serrate) leaves and their *wavy lamellæ* afford good characters for distinguishing this species from *P. aloides.* I gathered near Pau, by the Bordeaux road, an ano-

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malous *Polytrichum*, which may possibly be a starved form of *P. nanum*. It has the capsule subcernuous, nearly spherical; *the columella* 4-*sulcate*, or rudimentarily alate (not *terete* as in typical *P. nanum*); and *the calyptra sheathing the whole of the capsule*.

183. *P. aloides*, Hedw. Musc. Frond. i. t. 14; M. P. 304; Br. Europ. *Pogonatum*, p. 6. t. 8.

Hab. Z_{0-3} in humidiusculis, præsertim in arena rivulorum, altius versus alpes ascendens quam *P. nanum*.

184. *P. urnigerum*, L. Sp. Pl. p. 1573; M. P. 305; Br. Europ. *Pogonatum*, p. 7. t. 9.

Hab. Z_{0-2} in arenosis humidiusculis.

185. *P. alpinum*, L. Sp. Pl. p. 1573; Br. Europ. *Pogonatum*, p. 9. t. 10.

Hab. Z_{2-4} P. c. in monte *Crabioules*.

Var. caule valde elongato, subsimplici; M. P. 306.—*Hab.* in saxosis umbrosis vallis *Lutour* prope *Cauterets*.

The curious way in which the *epiphragm* (the *tympaniform* dilatation of the summit of the columella) is attached to the peristome in this and other *Polytricha* does not seem to have been anywhere described. In *P. alpinum* it is originally placed at the base of the teeth, to which it is attached by means of processes equaling them in number and exactly covering their internal face. After the fall of the lid, these processes are gradually detached and the epiphragm rises, probably from the pressure of the full-grown spores beneath it, so as to allow the latter to escape through the interstices of the peristome. When the epiphragm is quite liberated, either naturally or by art, *the processes curve inwards upon its upper surface* (see Pl. I. fig. 1) so as to be with difficulty seen, unless the light be properly regulated or the epiphragm be set up on its edge. The processes are composed of only a single layer of cellules, which are so disposed that their interstices form vertical lines corresponding to those on the teeth.

The adhesion of the epiphragm to the teeth is so great as to resist the action of the columella to draw it down into the capsule, and often ultimately to cause the rupture of the columella. The ragged portion at the underside of the section (fig. 2) is where the rupture takes place between the columella and the epiphragm.

In *P. urnigerum*, *aloides* and *nanum* the epiphragm is attached to the teeth in the same manner, but the processes are very thin and tender, and when the epiphragm is detached by force they often remain adhering to the teeth. In *P. angustatum* (as also probably in *P. undulatum*) the processes are united to each other by an intervening membrane, which is *granulated* on the surface, while the processes themselves are *smooth* and marked by lines similar to those on the teeth: in other words, the epiphragm is bordered by an inflexed *continuous* membrane, by means of which it adheres to the peristome. The figure of *P. angustatum* in 'Bryol. Europæa' represents this pretty well, but no mention is made of it in the text.

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§ 4. (= POLYTRICHUM, Brid. et Bryol. Europ.)

186. *P. sexangulare,* Hoppe, Bot. Taschb. p. 150; Br. Europ. *Polytrichum,* p. 7. t. 11.
Hab. Z_{3-4} P. c. locis *Esquierry* et *Port de Paillère* (Arnott !).

187. *P. formosum,* Hedw. Sp. Musc. t. 9; Br. Europ. *Polytrichum,* p. 9. t. 12; M. P. 307.
Hab. Z_{0-2} ad terram in sylvis, haud infrequens.

188. *P. commune,* L. Sp. Pl. p. 1573; Br. Europ. *Polytr.,* p. 13. t. 17; M. P. 308.
Hab. Z_{0-2} in Agri Syrtici ericetis; in Pyrenæorum rupestribus humidis.

189. *P. juniperinum,* Hedw. Sp. Musc. t. 13; Br. Europ. *Polytr.,* p. 12. t. 15; M. P. 309.
Hab. Z_{1-5} in rupibus terra obtectis, e montibus humilioribus usque in summos alpes ascendens.

190. *P. piliferum,* Schreb. Fl. Lips. p. 74; Br. Europ. *Polytr.,* p. 11. t. 14; M. P. 310.
Hab. Z_{1-4} locis sterilibus ventosis: haud vulgare.

Tribus 14. BUXBAUMIACEÆ, Bryol. Europ.

25. *Buxbaumia,* Haller.

191. *B. aphylla,* Hall. Stirp. Helv. 2. p. 83; Br. Europ. fasc. 1 (cum icone).
Hab. Z_0 P. occ. in vicinia *St. Sever,* ubi in declivibus arenosis umbrosis secus fl. *Adour* ripas invenit cel. Dufour !

192. *B. indusiata,* Brid. 1. p. 331. t. Suppl. 2; Br. Europ. fasc. 1. p. 6. t. 2.
Hab. Z_{1-2} in truncis putridis, rarissime. P. occ. in regione media montis *Pic de Ger*; nec non in valle *Jéret.* P. c. *Vallée de Campan* in sylva *Forêt de Paiollest* dicta (Philippe !).

26. *Diphyscium,* Web. et Mohr.

193. *D. foliosum,* L. Syst. Veg. ed. 14. p. 925 (sub *Buxbaumia*); Br. Europ. fasc. 1. p. 3. t. 2; M. P. 320.
Hab. Z_{0-1} ad terram in sylvis, vulgatum.

Tribus 15. MEESIACEÆ, Bryol. Europ. (ex parte).

27. *Meesia,* Hedwig.

194. *M. trichodes,* L. Suec. n. 1006 (sub *Bryo*); M. P. 147. *Meesia uliginosa,* Hedw.; B. et S. ! Br. Europ. fasc. 10. p. 5. t. 1.
Hab. Z_{2-4} P. occ. in spongiosis montis *Lizé.* P. c. secus ripas lacus *Lehou*; *Vallon du Houre* (Philippe !); *Esquierry* (Arnott !). P. or. *V. d'Eynes* (Arnott !).

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Tribus 16. FUNARIACEÆ, Bryol. Europ. (ex parte).

28. *Amblyodon*, Pal. Beauv.

195. *A. dealbatus*, Dicks. Crypt. fasc. 2. p. 8. t. 5. f. 3 (sub *Bryo*); Br. Europ. *Amblyodon* (cum ic.).

Hab. Z_2 in spongiosis. P. occ. in monte *Lizé*, socio *Meesia trichode*. P. or. *Port Nègre* (Arnott !).

29. *Funaria*, Schreber.

196. *F. hygrometrica*, L. Sp. Pl. p. 1575 (sub *Mnio*); Br. Europ. *Funaria*, t. 3; M. P. 148.

Hab. Z_{0-3} locis exustis, ruderatis et calcareis.

197. *F. convexa*, Spruce in Musci Pyr. 149. *F. serrata*, B. et S. Br. Europ. *Funaria*, p. 8. t. 2 (non Brid. Br. Univ. 2. p. 57).

Hab. Z_0 P. occ. *St. Sever*, in aggeribus arenosis, socio *F. Muehlenbergii*, a quo *operculo convexo* neutiquam convexo-conico primo visu dignoscenda.

I had come to the conclusion that this moss must be distinct from the *F. serrata* of Bridel (whose specimens were Pennsylvanian ones communicated by Palisot-de-Beauvois) before I had the opportunity of examining the specimens so named by Hooker and Wilson in Drummond's 'Mosses of the Southern States,' &c., No. 76, and those of Sullivant in his beautiful 'Musci Alleghanyenses,' No. 126; and it is satisfactory to find my opinion supported by the decisions of these eminent botanists. The American specimens agree much better with Bridel's description in the form of the leaves, &c. than do those of Bruch and Schimper. I find the perichætial leaves of the former to be *oblong-lanceolate*, acute or subapiculate (*never acuminate*), plane, *serrated almost to the very base*, the rather strong nerve reaching *nearly to the point*, and it is sometimes only with a tolerably high power that it can be ascertained to fail one or two cellules below it. Bridel calls the leaves "acuminata" in his spec. char., but in his description he uses the more applicable term "acutiuscula." Of the nerve he says "proxime sub apicem abrupto nunc paulum excurrente:" I have never seen it excurrent, but it may well have appeared so in some cases with the inferior instruments which Bridel seems to have used.

F. convexa has the leaves larger, proportionally *much wider, spathulato-acuminate* ("forma peculiari, subspathulata," Br. Europ.), concave, the marginal serratures rarely descending below the middle, *the feeble nerve only $\frac{3}{4}$ the length of the leaf*, and the areolation wider; the pedicel shorter, when dry *twisted to the right*; the mouth of the capsule more oblique and the teeth of the peristome with fewer articulations.

F. convexa is distinguished from *F. Muehlenbergii* by another obvious character, besides the one above-mentioned, namely by the calyptra being *persistent* on full-grown dried capsules, its beak *pointing downwards* and usually parallel to the pedicel; whereas in the

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latter, the calyptra is *rarely persistent* on nearly mature capsules, in the dried state, and in these rare cases it is nearly *erect*. See also Bryol. Europæa, *loc. cit.*

198. *F. Muehlenbergii,* Turn. in Ann. of Bot. ii. p. 198; Schwgr. Suppl. t. 66; Bryol. Europ. *l. c.* t. 1; M. P. 150.

Hab. Z_{0-1} P. occ. in solo arenoso circa *St. Sever.* P. c. in rupibus calcareis terra obtectis juxta thermas dict. *de Salut, B.-de-Bigorre.*

I gathered very sparingly on mortar in a wall near Oloron, a *Funaria* almost intermediate between this species and *F. hibernica.* The leaves are rarely obovate, usually ovate, acute or subapiculate; the nerve stronger than in *F. Muehlenbergii,* and failing very little below the apex; the margins almost quite entire. Pedicel when dry *twisted to the left,* except just beneath the capsule, where there is usually one turn to the right.

30. *Entosthodon,* Schwgr.

199. *E. Templetoni,* Hook. in Fl. Lond. ed. 2 (sub *Weisia*); H. et T.! Musc. Brit. p. 77. t. 14; Br. Europ. *Entosthodon* (cum ic.); M. P. 151.

Hab. Z_0 P. occ. in Agro Syrtico circa *St. Sever* et *St. Pandelon,* ubi ad terram arenosam socio *Physcomitrio fasciculari* viget.

31. *Physcomitrium,* Brid.

200. *Ph. ericetorum,* De Not. Syllab. p. 283; Bryol. Europ. *Physcomitrium,* p. 13. t. 3; M. P. 152. *Gymnostomum fasciculare,* H. et T.! Musc. Brit. p. 23. t. 7.

Hab. Z_{0-1} P. occ. ad fossarum margines circa *Pau* et *St. Sever.*

201. *Ph. fasciculare,* Hedw. Sp. Musc. t. 4 (sub *Gymnostomo*); Br. Europ.! *l. c.* p. 13. t. 4; M. P. 153.

Hab. Z_{0-1} cum præcedente; etiam P. c. circa *B.-de-Bigorre.*

202. *Ph. pyriforme,* Hedw. Sp. Musc. p. 38 (sub *Gymnost.*); Br. Europ. *l. c.* p. 11. t. 2; M. P. 154.

Hab. Z_{0-1} in iisdem locis ac n. 201.

203. *Ph. acuminatum,* Schleich. Cat. Plant. Helvet. p. 40 (sub *Gymnost.*); Br. Europ. *l. c.* p. 11. t. 3.

Hab. $Z_{1\ sup.}$ in muro e limo constructo supra viculum *Bagès* vallis *d'Ossau*: rarissime.

32. *Ephemerum,* Hampe in Linnæa, 1832.

204. *E. serratum,* Schreb. de Phasco, p. 9. t. 2 (sub *Phasco*). *Phascum serratum,* Br. Europ. fasc. 1. p. 6. t. 1.

Hab. Z_1 in agris cultis prope *B.-de-Bigorre,* rarissime.

In the 'Synopsis Muscorum' of C. Mueller (Berolini, 1848), where the classification of the genera displays much originality and acuteness of observation, the *Ephemera,* along with *Ephemerella,*

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C. M., and *Voitia*, Hornsch., form a distinct tribe, under the name of *Ephemereæ*; but, considered as to the *sum* of their characters, I apprehend they must be united to *Funariaceæ*. The transition to recognized members of the latter family is in fact so gradual that it is impossible to indicate where the break should be made. *Ephemerum patens*, for example, is undistinguishable except by very minute examination from *Aphanorhegma serrata*, Sullivant (in Gray's 'Manual of the Botany of the Northern United States,' p. 647), which on its side is scarcely generically distinct from *Physcomitrium*. And if, by the almost universal consent of bryologists, *gymnostomous* mosses are no longer to form a separate tribe, but are to be distributed among those peristomatous tribes and genera to which they have in all their other characters a perfect affinity, why should we accord a greater favour to *astomous* mosses, which repose on an equally *negative* character for their separation? In other words, if there be no acknowledged tribe of *Gymnocarpi*, why should there be one of *Cleistocarpi*? This query is rendered more unanswerable by the consideration, that as there are individual mosses (e. g. *Encalypta vulgaris*) which unite in themselves the characters of *Gymnostomi* and *Peristomati*, so there are other individuals which equally unite the characters of *Gymnostomi* and *Astomi*; I need only instance *Phascum rostellatum*, Brid., which has in some instances a *persistent*, in others a *deciduous* operculum, and is thus in itself both *cleistocarpous* and *stegocarpous*: if the former be considered its normal condition, it should be (according to our existing artificial systems) a *Phascum*; if the latter, a *Hymenostomum*!

I may in this place take occasion to remark on the very great rarity of Phascoid and other *annual* mosses in the Pyrenees. *Above the montose zone, I did not observe a single annual moss*, for *Funaria hygrometrica* cannot strictly be considered such. There is the same peculiarity in arctic countries, as for instance in Lapland, where according to Wahlenberg the *Phasca* and the smaller species of *Tortula* and *Gymnostomum* (i. e. *Pottia*) are altogether wanting! Contrast with this the following list of *Phasca*, abundant in cultivated ground near Montpellier in the autumnal and early winter months, which I owe to the kindness of Mr. Bentham: *Phascum axillare, bryoides, carniolicum, crispum, curvicollum, cuspidatum, Flœrkeanum, muticum, pachycarpum* and *rectum*.

Tribus 17. Splachnaceæ, Bryol. Europ.

33. *Tayloria*, Hook.

205. *T. serrata*, Hedw. Spec. Musc. t. 8 (sub *Splachno*); Br. Europ. *Tayloria*, p. 6. t. 1; M. P. 156.

Hab. Z_3 P. c. in monte *Crabioules* et ad lacum *Espingo*, juxta pastorum tuguria, terrestris.

Var. γ. *tenuis*, Br. Europ. *l. c.* t. 2; M. P. 157. *Splachnum tenue*, Dicks. Cr. Fasc. 2. p. 2.

Hab. Z_2 P. occ. supra ligna putrida in valle *Jéret*.

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34. *Dissodon,* Grev. et Arnott.

206. *D. Frœlichianus,* Hedw. Musc. Frond. iii. p. 99. t. 40 (sub *Splachno*).

Hab. Z_4 in terra humida P. centr. locis *Cirque d'Arbizon* (Philippe!) et ad latus boreale montis *Pic du Midi* dict. (De Lugo!)

Tribus 18. POTTIACEÆ, Br. Europ. (ex parte).

35. *Acaulon,* C. Muell. in Bot. Zeit. 1847, p. 99.

207. *A. muticum,* Schreb. (sub *Phasco*); Br. Europ. *Phascum,* p. 8. t. 2.

Hab. Z_{0-1} P. occ. et c. ad terram, sed rarius. *St. Sever. B.-de-Bigorre.*

As I have above considered it expedient to place *Ephemerum* in *Funariaceæ,* on the same principle *Acaulon* and its allies (*Phascaceæ,* C. Muell., excluding *Ph. crispum, multicapsulare, polycarpum* and *rostellatum,* which belong to *Weisiaceæ*) must go into *Pottiaceæ.* The near affinity of *Pottia minutula* to *Phascum cuspidatum,* &c. is too obvious to require proof; and as there are some *Phasca* (e. g. *Ph. bryoides*) which have an easily *separable,* not to say *deciduous* lid, there would seem to be no character, either natural or artificial, sufficiently constant to justify the separation of the latter from *Pottiaceæ.*

36. *Phascum,* Linnæus.

208. *Ph. cuspidatum,* Schreb. de Phasco, p. 8. t. 1; Br. Europ. *Phascum,* p. 12. t. 6; M. P. 322.

Hab. Z_1 in campis incultis prope *B.-de-Bigorre,* rarum.

37. *Pottia,* Ehrhart.

209. *P. truncata,* Hedw. Musc. Frond. i. p. 13. t. 5 (sub *Gymnostomo*); Br. Europ. *Pottia,* t. 4.

Hab. Z_{0-1} locis cultis, ruderatis, &c.

38. *Anacalypta,* Roehling.

210. *A. latifolia,* Web. et M. B. T. p. 147 (sub *Grimmia*); Br. Europ. *Anacalypta,* t. 4.

Hab. Z_4 P. c. in altioribus montis *Pic du Midi de Bagnères* (Philippe!).

211. *A. Starkeana,* Hedw. Musc. Frond. iii. p. 83. t. 34 (sub *Weisia*); Br. Europ. *l. c.* t. 1.

Hab. Z_{0-1} P. c. in solo calcareo juxta thermas dict. *de Salut* prope *B.-de-Bigorre.*

Var. β. *brachyodus,* Br. Europ. (*Weisia affinis,* Musc. Brit. p. 79. t. 14).—*Hab.* P. occ. in arenosis prope *St. Sever.*

212. *A. lanceolata,* Hedw. Musc. Frond. iii. p. 66. t. 23 (sub *Leersia*); Br. Europ. *l. c.* t. 2.

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Hab. Z_1 P. c. locis ruderatis secus ripas fl. *Adour* supra *Bagnères* ! (Philippe !). Nusquam alias nobis nota.

39. *Desmatodon,* Bridel.

213. *D. latifolius,* Hedw. Musc. Frond. i. t. 30 (sub *Dicrano*) ; Br. Europ. *Desmatodon,* p. 5. t. 1 ; M. P. 158.

Hab. Z_{3-4} in alpinis, terrestris. P. occ. *V. de Combascou.* P. c. *Port de Bénasque* ; *Pic du Midi* (Philippe !). P. or. *V. d'Eynes* (Montagne !) ; *Canigou, Cambrédazes* et *V. d'Eynes* (Arnott !).

Var. β. *muticus,* Brid. ; Br. Europ. ! *l. c.* t. 2 ; M. P. 159. *D. glacialis,* Funk.

Hab. Z_{4-5} in summis Pyrenæis. *Port de Cauterets. Esquierry.*

214. *D. nervosus,* H. et T. ! Musc. Brit. p. 115. t. 20 (sub *Didymodonte*) ; Br. Europ. *l. c.* p. 6. t. 3 ; M. P. 160.

Hab. Z_1 P. c. in rupibus argillaceo-schistosis subdecompositis prope pagum *Loucrup,* non longe a *B.-de-Bigorre,* ubi am. Philippe detexit. P. or. ad viam quæ ducit a *Seo d'Urgel* ad Andorram (Arnott !) ; apud *Concampa* et ad *Pla de Sorroco* prope *Prats de Mollo* (Montagne !).

Tribus 19. Trichostomaceæ, Bryol. Europ.

40. *Tortula,* Hedwig.

Obs. The following species were observed only on calcareous rocks or soil, or on mortar in walls : *T. rigida, aloides, chloronotos, tortuosa, inclinata, squarrosa* and *paludosa.* Above the region of forests only two species were seen, viz. *T. aciphylla* and a var. of *T. vinealis.*

§ 1. Aloideæ, Bryol. Europ.

215. *T. rigida,* Schultz. Recens. Gen. Barbulæ et Syntr. t. 32. fig. 1 (sub *Barbula*) ; M. P. 161 ; Br. Europ. *Barbula,* p. 13. t. 1. *T. enervis,* H. et Grev. in Brewst. Journ. v. P. 1. p. 288.

Hab. Z_1 in terra calcarea, frequens. *Les Eaux Chaudes* ; *Gavarnie* ; &c.

216. *T. ambigua,* B. et S. ! Br. Europ. *Barbula,* p. 14. t. 2 ; M. P. 162.

Hab. Z_0 P. occ. in aggeribus subhumidis *St. Sever.*

217. *T. aloides,* Koch in Brid. Br. Univ. i. p. 816 (sub *Trichostomo*) ; M. P. 163 ; Br. Europ. *Barbula,* p. 15. t. 2. *Tortula rigida,* Turn. ; H. et T. ! Musc. Brit. p. 53. t. 12.

Hab. Z_{0-1} P. occ. et c. in aggeribus calcareis circa *B.-de-Bigorre,* &c.

§ 2. Chloronotæ, Bryol. Europ.

218. *T. chloronotos,* Brid. Mant. Musc. p. 90, et Br. Univ. i. p. 539 (sub *Barbula*). *T. membranifolia,* Hook. Musci Exotici, t. 26 ; M. P. 164. *Barbula membranifolia* et *chloronotos,* Br. Europ.

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Hab. Z_{0-1} P. occ. in declivibus calcareis prope *Bilhères*, ad viam quæ ducit a *Pau* ad Bayonnam. P. c. ad pagum *Pouzac* (Philippe !). P. or. *Trancade d'Ambouilla* (Arnott !). "In Pyrenæis orientalibus et monte Serrato Cataloniæ ubi in terra ochracea primi legimus;" Bridel, *l. c.*

I have never been able to perceive the differences between *T. chloronotos* and *membranifolia* insisted on in 'Bryol. Europæa' (*Barbula*, p. 18), and specimens of the former communicated by M. Schimper from Avignon have the *inflorescence monoicous*, the stem branched and the *leaves membranous at the apex*, precisely as in *T. membranifolia*. In these specimens, as in Arnott's, Philippe's, and my own from Bilhères, besides there being axillary male flowers on the fertile plants, there are also *separate male plants* with terminal flowers; but I have seen no specimen of *T. chloronotos* with a truly dioicous inflorescence.

§ 3. Cuneifoliæ, Bryol. Europ.

219. *T. cuneifolia*, Dicks. Crypt. Fasc. 3. p. 7 (sub *Bryo*); M. P. 165; Br. Europ. *Barbula*, p. 31. t. 17.

Hab. Z_0 P. occ. in terra argillaceo-arenosa circa *St. Sever*: sociis *Funaria convexa* et *Muehlenbergii*.

220. *T. canescens*, Mont. Archives de Bot. i. p. 133; M. P. 166; Br. Europ. ! *Barbula*, p. 34. t. 19.

Hab. Z_{0-1} P. occ. *Landes de Mugriet*, in solo arenoso. P. c. in rupibus schistosis prope *B.-de-Bigorre* et *Loucrup*. P. or. apud Illiberim in agro Ruscinonensi (Montagne).

221. *T. marginata*, B. et S. Br. Europ. *Barbula*, p. 33. t. 19.

Hab. Z_1 P. or. prope *Corbières*, loco *hermitage de St. Antoine de Galamus* (Montagne, *l. c.* sub nom. *T. cæspitosa*, H. et G.). P. occ. in muris prope *Cauterets*.

222. *T. muralis*, L. Sp. Pl. p. 1581 (sub *Bryo*); M. P. 167; Br. Europ. *l. c.* p. 35. t. 20.

Hab. Z_{0-3} in muris saxisque.

§ 4. Rurales, Bryol. Europ.

223. *T. ruralis*, L. Sp. Pl. p. 1581 (sub *Bryo*); Br. Europ. *l. c.* p. 42. t. 27.

"Var. 1, foliis patulis nec squarroso-recurvis;" M. P. 168. *Barbula ruralis β. rupestris*, Br. Europ. *Syntrichia intermedia*, Brid. ! Br. Univ. i. p. 586.

Hab. Z_{0-1} in calce arenato murorum prope *Pau*.

This form, which, as the authors of 'Br. Europ.' remark, is found only on a calcareous matrix, is sometimes scarcely larger than *T. muralis*, and its habit is very different from that of the larger, ordinary form of *T. ruralis*; yet it seems impossible to separate it specifically. I have the same form from Dr. Grateloup, gathered near

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Bordeaux, and from Dr. Arnott gathered at Avignon, Vaucluse and Restinclières. It matures its fruit in the very early spring.

"Var. 2, foliis acutioribus nonnunquam acuminatis;" M. P. 169.—*Hab.* Z_{1-3} locis editioribus secus rivulos, saxatilis. *V. de Combascou*; *Gavarnie*; &c.

224. *T. aciphylla*, B. et S. ! Br. Europ. *Barbula*, p. 42. t. 26; M. P. 170.

Hab. Z_{3-4} P. occ. et c. locis saxosis secus ovilia ad basin montis *Maladetta*; in valle *Combascou*, &c. *Vallon d'Arise* (Philippe !).

In the Pyrenees, as in the Alps, this occupies the highest region of pasturage, and is never found away from the summer habitations of men and cattle.

225. *T. lævipila*, Brid. Mant. Musc. p. 98 (sub *Syntrichia*); Br. Europ. *l. c.* t. 25.

Hab. Z_{0-1} ad arborum truncos.

226. *T. papillosa*, Wils. ! mst.; Spruce in Lond. Journ. of Bot. iv. 193; M. P. 171.

Hab. Z_1 P. occ. in arboribus nemoris *Parc de Pau* dicti.

227. *T. latifolia*, Bruch !; Bryol. Europ. *l. c.* p. 41. t. 24; M. P. 172.

Hab. Z_1 P. occ. locis humidis circa *Jurançon*, ad arborum radices.

§ 5. Subulatæ, Bryol. Europ.

228. *T. mucronifolia*, Brid. Mant. Musc. p. 97 (sub *Syntrichia*); Br. Europ. ! *l. c.* p. 38. t. 23.

Hab. "in Pyrenæis orientalibus" (Bridel, *l. c.*); *Mont Louis* (Arnott !).

229. *T. subulata*, L. Sp. Pl. p. 1581 (sub *Bryo*); M. P. 173; Br. Europ. *l. c.* p. 36. t. 21, 22.

Hab. Z_{0-4} ad terram, passim.

Var. β. *inermis*, Brid. Br. Univ. i. p. 581. *T. inermis*, Mont. Arch. de Bot. i. p. 136. t. 4.—*Hab.* "ad *Notre Dame de Peña* in agro Ruscinonensi;" (Montagne, *l. c.*)

This is quite possibly a distinct species, as Dr. Montagne still maintains, but as I have seen only barren specimens of it, gathered by Dr. Arnott at Vaucluse, I confess myself unable to form a decided opinion.

§ 6. Convolutæ, Bryol. Europ.

230. *T. convoluta*, Hedw. Musc. Frond. i. t. 32 (sub *Barbula*); M. P. 174; Br. Europ. *l. c.* p. 29. t. 16.

Hab. Z_{0-1} in terra et muris, haud vulgaris.

"Var. *fragilifolia*, foliis multo longioribus, linearibus, patulo-recurvis, alis undulatis, perichætii laxioris acuminatis;" M. P. 175. —*Hab.* P. occ. in muris pagorum *Jurançon* et *Bilhères*.

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§ 7. Revolutæ, Bryol. Europ.

231. *T. revoluta,* Brid. in Schrad. Journ. Bot. 1800; Br. Europ. *l. c.* p. 27. t. 14; M. P. 176.

Hab. Z_{0-1} cum n. 230, multo autem copiosior.

§ 8. Tortuosæ, Bryol. Europ.

232. *T. tortuosa,* L. Sp. Pl. p. 1583 (sub *Bryo*); Br. Europ. *l. c.* p. 26. t. 13; M. P. 177.

Hab. Z_{1-3} in muris saxisque calcareis, copiosissima et pulcherrime fructifera; rarius ad arbores vetustas.

The cellules of the leaf are minutely papillose, and when viewed from above each marginal cellule usually shows two *salient* papillæ: it is this which gives the edge of the leaf the appearance of being granulated. Is it caused by the pressure of the grains of chlorophyll on the delicate walls of the cellules?

233. *T. inclinata,* Schwgr. Suppl. t. 33 (sub *Barbula*); Br. Europ. *l. c.* p. 25. t. 12; M. P. 178.

Hab. Z_1 P. occ. et c. in muris rupibusque calcareis, haud infrequens. *Les Eaux Chaudes. Rontignon. B.-de-Bigorre,* &c.

234. *T. squarrosa,* De Not. Specim. de Tort. Ital. n. 31; Spruce in Lond. Journ. of Bot. iv. p. 193; M. P. 179; Br. Europ. fasc. 31. p. 1. t. 1.

Hab. Z_1 in collibus calcareis prope *Jurançon* et *B.-de-Bigorre. Pic St. Loup* prope *Montpellier* (Arnott!).

235. *T. cæspitosa,* Schwgr. Suppl. t. 31 (sub *Barbula*); M. P. 180; Sullivant! Musci Allegh. n. 150. *Barbula cirrhata,* Bryol. Europ.! *Barbula,* p. 24. t. 11.

Hab. Z_2 P. occ. supra ligna putrida in faucibus inter pagum *Penticosa,* et balneas ejusdem nominis, in Aragonia: rarissima.

§ 9. Unguiculatæ, Bryol. Europ.

236. *T. unguiculata,* Hedw. Musc. Frond. i. t. 23 (sub *Barbula*); M. P. 181; Br. Europ. *Barbula,* p. 19. t. 5.

Hab. Z_{0-1} in muris, &c., frequens; in rupibus ophiticis loco *Gorge de Labassère.*

237. *T. paludosa,* Schwgr. Suppl. t. 30 (sub *Barbula*); M. P. 182; Br. Europ.! *l. c.* p. 21. t. 7.

Hab. Z_{1-2} in rupibus udis calcareis regionis fagorum, sat frequens. *Gorge de Hourat* prope *les Eaux Chaudes; Mt. Lhieris,* &c. Nusquam in *paludibus* vidi!

238. *T. gracilis,* Schwgr. Suppl. t. 34 (sub *Barbula*); Br. Europ. *l. c.* p. 22. t. 8.

Hab. in Pyrenæis orientalibus (Bridel, Br. Univ. 1. p. 537).

239. *T. fallax,* Hedw. Musc. Frond. i. t. 24 (sub *Barbula*); M. P. 183; Br. Europ. *l. c.* p. 23. t. 9.

Hab. Z_{0-2} in rupestribus subhumidis.

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240. *T. vinealis,* Brid. Br. Univ. i. p. 830 (sub *Barbula*); Br. Europ. *l. c.* p. 24. t. 10.

Var. *β. flaccida,* Br. Europ.; M. P. 184.—*Hab.* Z_1 P. c. ad ripas rivuli qui ad monasterium *Médous* prope *B.-de-Bigorre* originem suam habet.

Var. *nivalis,* M. P. 185.—*Hab.* Z_4 in rupibus frigidis ab aqua nivali irrigatis vallis alpinæ *Esquierry* dictæ.

This second variety forms large compact tufts on the ledges of dripping rocks, growing near *Senecio Tournefortii, Euphrasia minima* and *Luzula spadicea.* The stems attain a length of 6 or 8 inches, and are clad throughout with leaves of a deep reddish brown. Hence its aspect is very different from that of the ordinary form of *T. vinealis,* but without the fruit I do not venture to separate it.

41. *Didymodon,* Schwgr. (*ex parte*).

241. *D. rubellus,* Hoffm. Deut. Fl. ii. p. 33 (sub *Bryo*); Br. Europ. *Didymodon,* p. 3. t. 1; M. P. 186. *Weisia curvirostra,* H. et T.! Musc. Brit. p. 84. t. 14.

Hab. Z_{0-2} in muris, rupibus, &c.

242. *D. cylindricus,* Bruch in Brid. Br. Univ. i. p. 806 (sub *Weisia*); Br. Europ. *l. c.* p. 5. t. 3; M. P. 187.

Hab. Z_2 P. occ. in saxis rivulorum supra thermas dict. *les Eaux Bonnes*; P. c. in vicinia *B.-de-Luchon,* frequens, locis *Superbagnères, Lac de Séculéjo, Cascade du Cœur,* &c.

42. *Trichostomum,* Hedwig.

Obs. T. flexicaule is the only species of this genus which seems absolutely confined to calcareous rock: *T. mutabile, crispulum* and *tophaceum* were observed on no other rock in the Pyrenees, but in England I have occasionally seen them in habitats where no trace of carbonate of lime was to be detected. The last five species form part of the genus *Leptotrichum* of Hampe, and are placed by C. Mueller in his tribe *Leptotrichaceæ* (Conf. Syn. Musc. p. 415).

§ 1. Crispula.

243. *T. mutabile,* Bruch mst.; Br. Europ. *Trichostomum,* p. 8. t. 5; M. P. 188.

Hab. Z_1 locis calcareis. P. occ. ad pagum *Narcastet.* P. c. in rupibus umbrosis prope *B.-de-Bigorre* (*Chemin de Labassère* et *Bains de Salut*). An revera a sequente distincta species?

244. *T. crispulum,* Bruch et Muell. in Regensb. Bot. Zeitung, 1829; Br. Europ. *l. c.* t. 4; M. P. 189. *Didymodon Benthamii,* Arnott! in Edinb. New Philosoph. Journ. 1846.

Hab. Z_1 in rupibus calcareis irroratis Pyren. occidentalium, frequens. *Pau; Narcastet,* &c. *Restinclières* prope *Montpellier* (Arnott!).

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"Var. foliis acumine subrecto;" M. P. 190. (Medium inter vars. β. et γ. Br. Europ.)—*Hab. Vallée d'Ossau* prope pagos *Louvie* et *Jurançon*.

§ 2. Rigidula.

245. *T. tophaceum*, Brid. Mant. Musc. p. 84; Br. Europ. *l. c.* p. 9. t. 6; M. P. 191.

Hab. Z_1 P. c. ad mortarium in muris subhumidis pagi *Loucrup*, non longe a *B.-de-Bigorre*. P. or. "ad *St. Antoine de Galamus* cum *Tortula marginata*, nec non prope turrim nomine *La Massane* insignitam" (Montagne, *l. c.*).

246. *T. luridum*, Hsch. (sub *Cynodonte*); M. P. 192. *Didymodon luridus*, Br. Europ. *Didym.* p. 4. t. 2.

Hab. Z_1 P. occ. in calcareis subhumidis prope *Pau*: socio *Tortula chloronoto*. Prope Burdigalam (Grateloup!).

247. *T. rigidulum*, Hedw. Musc. Frond. iii. t. 4 (sub *Didymodonte*); Br. Europ. *Trichostomum*, p. 10. t. 7; M. P. 193.

Hab. Z_{1-2} in muris rupibusque tum siccis tum humidis, frequens. *Vallées de Castelloubon et d'Ossau*; *Luz*; *Mt. Lhieris*, &c.

§ 3. Glaucescentia.

248. *T. glaucescens*, Hedw. Musc. Frond. iii. t. 37; Br. Europ.! *l. c.* p. 18. t. 15; M. P. 194.

Hab. Z_{2-4} in rupium fissuris. P. occ. in vallibus *Combascou* et *Jéret*. P. c. *Lac de Séculéjo*; *Lac Lehou* (Philippe!). P. or. *Mt. Louis* et *V. d'Eynes* (Arnott!).

§ 4. Subulata (= Leptotrichum, Hampe).

249. *T. tortile*, Schrad. Crypt. Gewäsche, n. 49; Br. Europ.! *l. c.* p. 14. t. 10; M. P. 195.

Hab. Z_{0-2} in sylvaticis Pyrenæorum totorum ut et Agri Syrtici: terrestre. *V. du Lys*; *St. Pandelon de Dax*, &c.

250. *T. homomallum*, Hedw. Sp. Musc. t. 23 (sub *Didymodonte*); Br. Europ. *l. c.* p. 16. t. 2; M. P. 196.

Hab. Z_{0-2} in umbrosis humidis ad terram.

251. *T. flexicaule*, Schwgr. Suppl. t. 29 (sub *Cynodontio*); Br. Europ.! *l. c.* p. 15. t. 11; M. P. 197.

Hab. Z_1 locis calcareis, semper absque fructu.

252. *T. pallidum*, Hedw. Musc. Frond. 1. p. 71. t. 27; Br. Europ. *l. c.* p. 18. t. 14.

Hab. Z_{0-1} in arenosis umbrosis. P. occ. circa *Dax* (Thore, Grateloup). P. c. *B.-de-Bigorre*! (Philippe!). P. or. *Concampa* (Arnott!).

253. *T. subulatum*, Bruch! in Salzman Pl. Tingit.; Br. Europ. *l. c.* p. 17. t. 13; M. P. 198. *Didymodon aureus*, De Not. Syll. Musc. p. 190.

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Hab. Z_0 P. occ. ad aggeres arenosos umbrosos circa *St. Sever*, copiose et pulcherrime!

43. *Distichium*, Bryol. Europ.

254. *D. capillaceum*, Hedw. Musc. Frond. ii. t. 26 (sub *Swartzia*); Br. Europ. *Distichium*, p. 4. t. 1; M. P. 199.
Hab. Z_{1-4} in rupibus udis præsertim calcareis, frequens.

255. *D. inclinatum*, Hedw. Musc. Frond. 2. t. 27 (sub *Swartzia*); Br. Europ. *l. c.* p. 5. t. 2; M. P. 200.
Hab. Z_{3-4} P. c. in rupibus micaceis juxta lacum alpinum dict. *Lac Lehou*; nec non in valle alpina *Esquierry*: rarissimum.

Tribus 20. Bruchiaceæ, C. Muell.

44. *Astomum*, Hampe.

256. *A. nitidum*, Hedw. Musc. Frond. i. t. 34 (sub *Phasco*); Br. Europ. *Phascum*, p. 12. t. 6; M. P. 322.
Hab. Z_{0-1} P. c. in argillosis humidis secus viarum latera in valle *Trébons*, rarissime! P. occ. circa *Dax* (Grateloup in Fl. Française).

257. *A. alternifolium*, Brid. Mant. Musc. p. 10 (sub *Pleuridio*). *Phascum altern.*, Br. Europ.! *l. c.* p. 15. t. 7 (non Dicks., nec Schwgr.).
"Var. 1, antheridiis in floribus cauligenis gemmiformibus; etiam paraphysibus absque antheridiis (rarissime antheridiis nonnullis abortivis adjectis) in axillis foliorum superiorum dispositis;" M. P. 323.—*Hab.* Z_1 in arenosis humidis circa *Jurançon*.
"Var. 2, antheridiis absque paraphysibus in floribus gemmiformibus, et insuper antheridiis paraphysatis numerosis (nonnunquam *quinis*) in foliorum superiorum axillis;" M. P. 324.—*Hab.* Z_{0-1} in arenosis circa *St. Sever*, *Pau* et *B.-de-Bigorre*.—"Florescentia valde variabilis; species distincta tamen a *Ph. subulato* foliis perichætialibus videtur. Confer Br. Europ.;" M. P. *l. c.*

The inflorescence of *Phascum alternifolium* and of several other mosses (*e. g.* certain *Brya*) is by no means so constant to the type assigned in 'Bryologia Europæa' as the authors of that work would lead one to suppose; and fully prepared as I am to acknowledge the importance of the characters derived from the inflorescence, it appears to me that science will lose rather than gain if we shut our eyes to the aberrations which it undeniably presents. To assume a greater degree of invariableness in the inflorescence than exists in any other part of the plant, is as illogical as in practice it is found to be inaccurate.

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Tribus 21. SELIGERIACEÆ.

(*Seligeriaceæ* et *Campylosteliaceæ*, Bryol. Europ.)

45. *Campylostelium*, Bryol. Europ.

258. *C. saxicola*, W. et M. Bot. T. p. 167 (sub *Dicrano*); Br. Europ. *Campylost.* p. 3. t. 1.

Hab. Z_2 P. c. locis umbrosis in saxis arenaceis. *Labassère. V. de Castelloubon.*

46. *Brachyodus*, Fürnrohr.

259. *B. trichodes*, Mohr, Crypt. Gew. p. 85 (sub *Gymnostomo*); Br. Europ. *Brachyodus* (cum icone). *Weisia trichodes*, H. et T.! Musc. Brit. p. 82. t. 15; M. P. 228.

Hab. Z_1 P. c. in rupibus argillaceo-schistosis prope thermas dict. *de Salut, B.-de-Bigorre*, rarissime.

47. *Seligeria*, Bryol. Europ. (ex parte).

260. *S. Doniana*, Smith, E. Bot. t. 1582 (sub *Gymnostomo*); C. Muell. Syn. Musc. p. 420. *Anodus Donianus*, Br. Europ. (cum icone).

Hab. Z_1 P. c. in rupibus calcareis occultis prope *B.-de-Bigorre* (Philippe!).

261. *S. pusilla*, Hedw. Musc. Frond. ii. t. 29 (sub *Weisia*); Br. Europ. *Seligeria*, p. 4. t. 1; M. P. 227.

Hab. Z_{1-3} P. occ. in rupibus calcareis udis ad *Narcastet* prope *Pau*. P. c. in rupibus schistosis vallis *Castelloubon* et in ascensu ad *Port de Bénasque*.

262. *S. recurvata*, Hedw. Musc. Frond. i. t. 38 (sub *Grimmia*); Br. Europ. *Seligeria*, p. 6. t. 3; M. P. 229.

Hab. Z_1 P. c. in rupibus graniticis et arenaceis, locis *Gavarnie, V. de Castelloubon* et *Lesponne, Labassère* et *Superbagnerès*.

Tribus 22. DICRANACEÆ, Bryol. Europ. (ex parte).

48. *Ceratodon*, Bridel.

263. *C. purpureus*, Linn. (sub *Mnio*); Br. Europ. *Ceratodon*, p. 5. t. 1, 2. *Dicranum purpureum*, Hedw. Sp. Musc. p. 136. t. 36.

Hab. Z_{0-4} ad terram, in habitationum vicinia præcipue, socio *Funaria hygrometrica*.

264. *C. cylindricus*, Hedw. Sp. Musc. t. 24 (sub *Trichostomo*); Br. Europ. *l. c.* p. 6. t. 3; M. P. 201. *Angstræmia cylindrica*, C. Muell. Syn. Musc. p. 441.

Hab. Z_1 P. c. in rupibus arenaceis fragilibus montis *Superbagnères*: nusquam alias observatus.

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49. *Cynodontium,* Bryol. Europ.

265. *C. Bruntoni,* Smith, E. Bot. t. 2509 (sub *Dicrano*); Br. Europ. *Cynodontium* (cum ic.); M. P. 210. *Didymodon obscurus,* Kaulf.; Grev.! Scot. Cr. Fl. t. 193.

Hab. Z_1 in sylvis, rupestre. P. occ. *Bagès* prope *les Eaux Bonnes.* P. c. *V. du Lys; Bois de Gouerdère; V. de Lesponne* (Philippe!). P. or. in radice montis *Canigou* (Montagne!).

50. *Dicranum,* Hedwig.

§ 1. Polycarpa, Br. Europ.

266. *D. polycarpum,* Hedw. Musc. Frond. ii. p. 85. t. 31 (sub *Fissidente*); M. P. 209.

Hab. $Z_{1\ sup.-2}$ in virgultis, rupestre.

Var. β. *strumiferum,* Br. Europ. *Fissidens strumifer,* Hedw. —*Hab.* in rupibus umbrosis convallium *Jéret* et *Castelloubon.*

§ 2. Virentia, Br. Europ.

267. *D. virens,* Hedw. Musc. Frond. iii. p. 77. t. 32.

Hab. Z_{2-3} P. c. in sylvis humidis vallis *Lesponne* (Dufour! Philippe!). P. or. *V. d'Eynes* (Arnott!).

§ 3. Squarrosa, Br. Europ.

268. *D. flavescens,* Dicks. Crypt. fasc. 2. p. 4 (sub *Bryo*). *Dicranum flav.,* Smith! Fl. Brit. p. 1224 et E. Bot. t. 2263; M. P. 213. *D. pellucidum* var. γ. *serratum,* Br. Europ.

Hab. $Z_{1\ sup.}$ P. occ. in arena torrentis ad latus boreale montis *Goursi* prope *les Eaux Bonnes.* P. c. loco simili vallis *Lesponne.*

269. *D. pellucidum,* L. Sp. Pl. p. 1583 (sub *Bryo*); Schwgr. Suppl. t. 48; M. P. 214.

Hab. Z_{1-2} in rivulorum glareosis.

270. *D. squarrosum,* Schrad. Bot. Journ. v. p. 68; Br. Europ. *Dicranum,* p. 17. t. 5. *Angstræmia squarr.,* C. Muell. Syn. Musc. p. 438.

Hab. Z_{1-2} in arena rivulorum: haud vulgare et semper absque fructu. *V. de Lesponne,* &c.

§ 4. Crispa, Br. Europ.

271. *D. Schreberi,* Hedw. Sp. Musc. p. 144. t. 33; Br. Europ. *l. c.* p. 18. t. 6. *Angstræmia Schr.,* C. M. Syn. Musc. p. 438.

Hab. Z_{0-1} P. occ. in rupibus ophiticis humidiusculis *Sti. Pandelon* prope *Dax*: fertile sed rarissimum. P. c. ad terram in occultis prope *B.-de-Bigorre*: sterile.

§ 5. Rufescentia, Br. Europ.

272. *D. varium,* Hedw. Musc. Frond. ii. t. 34; M. P. 222. *Angstræmia varia,* C. M. Syn. Musc. p. 435.

Hab. Z_{0-1} in terra nuda subhumida, haud vulgatum.

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273. *D. rufescens,* Turn. Musc. Hibern. p. 66; Smith! Fl. Brit. p. 1210, et E. Bot. t. 1216; M. P. 223. *Angstræmia ruf.,* C. M. Syn. Musc. p. 436.

Hab. Z_1 P. occ. et c. in argillaceo-arenosis circa *Pau* et *B.-de-Bigorre,* sat frequens.

§ 6. Heteromalla, Br. Europ.

274. *D. curvatum,* Hedw. Sp. Musc. t. 31; M. P. 221. *Angstræmia curv.,* C. M. Syn. Musc. p. 433.

Hab. Z_{1-2} P. c. in declivibus graminosis umbrosis vallis *Lesponne* et monticuli *Olivet,* ut et in sylva dict. *Bois de Gouerdère*: socio *Trichost. homomallo.* P. occ. ad terram in valle *Jéret.*

275. *D. heteromallum,* L. Sp. Pl. p. 1583 (sub *Bryo*); Br. Europ. *Dicranum,* t. 15. *Angstræmia heter.,* C. M. Syn. Musc. p. 432.

Hab. Z_{0-2} in solo arenaceo.

Var. cæspitibus elongatis compactis; capsulis nonnullis subrectis; M. P. 220.—*Hab.* in rupibus ophiticis et arenaceis P. c. locis *Labassère* et *Superbagnères.*

§ 7. Falcata, Br. Europ.

276. *D. Starkii,* W. et M. Bot. T. p. 189; Br. Europ. *Dicranum,* p. 27. t. 17. "*D. falcatum,*" M. P. 219.

Hab. Z_{3-4} in montibus editioribus, rupestre. P. c. *Mt. Maladetta*; *Mt. Crabioules*; *Esquierry*; *Lac d'Espingo*; *En montant au Lac Lehou* (Dufour!). P. or. loco non designato (Arnott!).

I gave this in 'Musci Pyrenaici' as *D. falcatum,* as being the older name and under the supposition that *D. Starkii* was not a distinct species; but I had then seen no *authentic D. falcatum.* The latter I am now convinced differs essentially in the smaller size, the *more rigid habit,* the *leaves more strongly* and uniformly *hooked,* with slenderer points, not flexuose when dry; the *shorter* and redder *capsules,* which are not subcylindrical but *obovate,* and are *not strongly sulcate when dry*; lastly in the redder teeth, which are also wider and less deeply cloven.

277. *D. falcatum,* Hedw. Sp. Musc. t. 32; Br. Europ. *l. c.* t. 18.

Hab. Z_{3-4} P. c. secus lacus *Lehou* ripas (Philippe!).

§ 8. Orthocarpa, Br. Europ.

278. *D. montanum,* Hedw. Sp. Musc. p. 145. t. 35. "*D. flagellare,* Hedw." M. P. 208.

Hab. Z_1 P. occ. et c. ad truncos vetustos in sylvis supra pagum *Jurançon* et circa *B.-de-Bigorre.*

279. *D. fulvum,* Hook. Musc. Exot. t. 149; Sullivant! Musci Allegh. n. 159; M. P. 207. *D. interruptum,* Brid. Musc. Rec.

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2. P. 1. p. 159, fide Bryol. Europ. (non *D. interruptum*, Smith ! Fl. Brit. p. 1205).

Hab. $Z_{1\ sup.}$ P. c. ad saxa granitica in sylvis convallium *Burbe* et *du Lys* prope *B.-de-Luchon.*

280. *D. Sauteri*, B. et S. ! Br. Europ. *l. c.* p. 33. t. 24; M. P. 206.

Hab. Z_{2-3} P. occ. in abiegnis nigris vallis *Jéret*; P. c. in regione inferalpina montis *Crabioules*: saxa granitica obtegens.

281. *D. longifolium*, Hedw. Musc. Frond. iii. p. 24. t. 9; M. P. 205.

Hab. Z_2 P. c. ad saxa granitica in nemore nigro secus cataractam dict. *Cascade du Cœur*, etiam in monte *Superbagnères*. P. or. *Port Nègre* (Arnott !).

§ 9. Scoparia, Br. Europ.

282. *D. scoparium*, Linn. ! Sp. Pl. p. 1582 (sub *Bryo*). *Dicranum scop.*, Hedwig; Smith ! Fl. Brit. p. 1201; Br. Europ. *l. c.* t. 26; M. P. 217.

Hab. Z_{1-2} in sylvaticis, copiose.

283. *D. fuscescens*, Turn. ! Musc. Hibern. p. 60 (1804); Smith ! Fl. Brit. p. 1204 (1804), et E. Bot. t. 1597; M. P. 218. *D. congestum*, Brid. Sp. Musc. i. p. 176 (1806); Br. Europ. *l. c.* t. 29.

Hab. $Z_{1\ sup.-2}$ P. occ. ad rupes graniticas et argillaceo-schistosas in vicinia oppiduli *Cauterets*, locis *Pont d'Espagne* et *Gorge de Cauterets.*

§ 10. Spuria, Br. Europ.

284. *D. spurium*, Hedw. Musc. Frond. ii. t. 20; Smith ! Fl. Brit. p. 1222, et E. Bot. t. 2167; M. P. 215.

Hab. Z_{0-1} P. occ. in ericetis Agri Syrtici loco *Landes de Mugriet*, necnon in monte *Goursi.*

§ 11. Undulata, Br. Europ.

285. *D. undulatum*, Schrad.; Smith ! Fl. Brit. p. 203; Sullivant ! Musci Allegh. n. 156. *D. polysetum*, Sw. Musc. Suec. p. 34 et 87; Schwgr. Suppl. t. 41; M. P. 216.

Hab. Z_1 in campis sylvarum gramineis, semper absque fructu. P. occ. *Bois de Jurançon*, &c. P. c. *V. de Serris.*

286. *D. majus*, Smith ! Fl. Brit. iii. p. 1202, et E. Bot. t. 1490; Br. Europ. *l. c.* t. 37.

Hab. Z_2 P. c. in rupibus umbrosis subhumidis vallis *Lesponne*: nullo alio loco in Pyrenæis mihi notum !

§ 12. (= Arctoa, Br. Europ.)

287. *D. fulvellum*, Dicks. Crypt. fasc. 4. t. 11. f. 1 (sub *Bryo*). *Dicranum fulvellum*, Smith; H. et T. ! Musc. Brit. p. 103. t.

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Suppl. 3; M. P. 224. *Arctoa fulvella,* Br. Europ. *Arctoa,* p. 4. t. 1; et *A. hyperborea,* Br. Europ. ! *l. c.* p. 5. t. 2.

Hab. Z_4 P. c. in rupibus subhumidis. *Esquierry. Crabioules. Lac Lehou.*

The Pyrenean specimens have the leaves of *Arctoa fulvella* (Br. Europ.), and the striated capsules of *A. hyperborea.* All the British specimens that I have seen under the name of *Dicranum fulvellum* have the *capsule striated,* while the leaves exhibit all intermediate forms between those attributed to *A. fulvella* and to *A. hyperborea*; hence I do not hesitate to consider these two mosses mere forms of one and the same species.

51. *Blindia,* Bryol. Europ.

288. *B. acuta,* Hedw. Musc. Frond. iii. t. 35 (sub *Weisia*); Br. Europ. *Blindia* (cum ic.); M. P. 225.

Hab. Z_2 P. occ. et c. in rupibus humidis vallis *Jéret,* necnon ad rupes cataractæ *Cascade du Cœur* humectatas: rarior.

52. *Campylopus,* Bridel.

289. *C. longirostris,* W. et M. Bot. Tasch. p. 155 (sub *Didymodonte*); M. P. 202. *Cynodontium longir.,* Schwgr. Suppl. t. 29. *Dicranodontium longir.,* Br. Europ. fasc. 41 (cum icone). *Dicranum denudatum,* Brid.; C. M. Syn. Musc. p. 403.

Hab. Z_{1-2} P. occ. et c. supra ligna putrida, rarius ad rupes. *Vallées de Lutour* et *du Lys,* &c.

290. *C. fragilis,* Br. Europ.? fasc. 41. p. 4. t. 2. *Dicranum Funkii,* C. M. Syn. Musc. p. 392.

Hab. Z_2 P. occ. in sylvis subhumidis circa *les Eaux Bonnes*: sterilis.

291. *C. atrovirens,* De Not. Syllab. Musc. p. 221; Br. Europ. fasc. 41. p. 5. t. 4. *Dicranum atr.,* C. M. Syn. Musc. p. 413.

Hab. Z_2 in sylvarum rupibus humidis, sterilis. P. occ. *Mt. Goursi.* P. c. *V. de Castelloubon.*

292. *C. longipilus,* Brid. Bryol. Univ. 1. p. 477; Br. Europ. fasc. 41. p. 6. t. 5; M. P. 203. *Dicranum longip.,* C. M. Syn. Musc. p. 411.

Hab. Z_1 P. occ. in saxis graniticis prope oppidulum *Laruns.*

†*C. elongatus,* Bridel: "caule indiviso elongato radiculoso-tomentoso apice fastigiato-ramoso, ramulis penicillatis, foliis caulinis inferioribus dissitis superioribus dense imbricatis omnibus appressis lineari-lanceolatis nervo latissimo obsoleto."

"*Hab.* circa *Dax* Aquitaniæ ubi D. Grateloup legit. Herb. Cand." Br. Univ. 1.

I suspect there is some mistake about the station attributed to this moss, which has a habit quite different from that of any European

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Campylopus. May it not have been inadvertently transposed from Dr. Grateloup's exotic Cryptogamia (from the Mauritius, Guadaloupe, &c.) to his collection of native French species?

Tribus 23. Weisiaceæ.

(*Weisiaceæ* et *Anœctangiaceæ*, Bryol. Europ.)

53. *Eucladium*, Bryol. Europ.

293. *E. verticillatum*, L. Sp. Pl. p. 1585 (sub *Bryo*); Br. Europ. *Eucladium* (cum ic.); M. P. 226.

Hab. Z_1 in declivibus calcareis subhumidis.

54. *Rhabdoweisia*, Bryol. Europ.

294. *Rh. fugax*, Hedw. Sp. Musc. t. 13 (sub *Weisia*); Br. Europ. *Rhabdow.* p. 4. t. 1. *Dicranum striatum*, M. P. 211.

Hab. Z_{1-2} P. occ. et c. ad rupes schistosas umbrosas, haud infrequens. In rupium madidarum fissuris faucium *Gorge de Cauterets* dict., pulcherrime!

295. *Rh. denticulata*, Brid. Suppl. Musc. i. p. 108 (sub *Weisia*); Br. Europ. *l. c.* p. 5. t. 2. *Dicranum denticulatum*, M. P. 212.

Hab. Z_{1-2} in rupium fissuris P. c. circa *B.-de-Luchon*, locis *V. du Lys*, *Bois de Gouerdère* et *Lac de Séculéjo*.

55. *Weisia*, Hedwig.

296. *W. cirrhata*, Hedw. Sp. Musc. p. 69. t. 12; Br. Europ. *Weisia*, p. 9. t. 6; M. P. 230.

Hab. Z_0 P. occ. in *Pini Piceæ* trunco in Agro Syrtico loco *Landes de Mugriet*. *Les Terres des Landes* (Grateloup).

297. *W. crispula*, Hedw. Sp. Musc. p. 68. t. 12; Br. Europ. *Weisia*, p. 9. t. 7; M. P. 231.

Hab. Z_{2-5} per Pyrenæos in saxis graniticis et schistosis, e subalpinis usque ad nives æternas.

Var. β. *atrata*, Br. Europ. *l. c.* (= β. *nigrescens* et γ. *atrata*, Br. Germ. p. 67. t. 30); M. P. 232.—*Hab.* in rupium subhumidarum fissuris loco *Port de Bénasque*.

This moss is equally alpine and arctic, and there is scarcely any other which flourishes and fructifies in such high latitudes and altitudes. It was gathered abundantly in Captain Parry's northern voyages, and Wahlenberg remarks of it, "in alpibus omnibus altius ascendit prope nivem perennem, quam quis alius muscus (excepto forsan *Polytricho juniperino*)."

298. *W. viridula*, L. Sp. Pl. p. 1584 (sub *Bryo*); Brid. Br. Univ. 1. p. 334; Br. Europ. *Weisia*, p. 5. t. 2, 3. *W. controversa*, Hedw. Musc. Frond. iii. t. 5; M. P. 233.

Hab. Z_{0-2} in terra ubique.

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"Var. foliis *nervo crasso* instructis; capsula inclinata, ovali et ovali-cylindrica, *stomate subobliquo* rubello; peristomii *dentibus brevibus,* irregularibus, *albidis*; floribus masculis gemmiformibus in ramis propriis terminalibus: *rarissime antheridiis* 1–2 *in perichætio fœmineo*;" M. P. 235.—*Hab.* in muris prope *Pau,* socio *Hymenost. tortili.*

This seems to be the var. δ. *amblyodon* of the 'Br. Europ.'; *W. amblyodon,* Brid. Br. Univ. i. p. 805; *W. amblyodon, gymnostomoides* and *microdonta,* Br. Germ. t. 25 et 37. In the rigid habit and in the form of the leaves it precisely resembles *Hymenost. tortile,* along with which it grew.

299. *W. Wimmeriana,* Sendtner in Denkschr. d. Regensburg. (sub *Gymnostomo*); Br. Europ. *Weisia,* p. 4. t. 1. "*W. controversa* var. 2, antheridiis 2–3nis in axillis fol. superiorum dispositis;" M. P. 234; et *Hymenostomum murale,* M. P. 236 (*forma hymenostomoidea*).

Hab. Z_1 P. occ. in arenosis circa *Pau* et *Oloron*; No. 236. M. P. in muris prope *Ste. Marie d'Oloron.*

The moss published in 'Musci Pyrenaici' as *Hymenostomum murale* (n. sp.) I have ascertained to be a form of *Weisia Wimmeriana.* Not one of the capsules I at first examined showed the least trace of peristome, but by renewed search I have at length found a capsule in which there are a few pale rudimentary teeth, scarcely rising above the annulus. As some excuse for this, it may be mentioned that *Weisia Wimmeriana* was originally referred to *Gymnostomum* by both Sendtner and Schimper.

56. *Hymenostomum,* R. Brown.

300. *H. microstomum,* Hedw. Musc. Frond. p. 71. t. 30 (sub *Gymnostomo*); Br. Europ. *Hymenost.* p. 4. t. 1.

Hab. Z_1 ad terram, rarissime! *B.-de-Bigorre. Pyrénées Orientales* (Montagne!).

301. *H. tortile,* Schwgr. Suppl. t. 10 (sub *Gymnostomo*); M. P. 237.

Hab. $Z_{1\ inf.}$ P. occ. in muris prope *Pau.* P. c. in rupibus calcareis juxta thermas dict. *de Salut, B.-de-Bigorre.* Circa *Montpellier* et *Vaucluse* (Arnott!).

57. *Gymnostomum,* Hedwig.

302. *G. calcareum,* H. et N. Bryol. Germ. p. 183. t. 10; Br. Europ. *Gymnostomum,* p. 6. t. 3, 4; M. P. 239.

Hab. Z_1 in calce arenato murorum ad pedem Pyr. occidentalium.—Var. β. *tenellum,* Br. Europ. *l. c.*; *Pau, Jurançon,* &c.—Vars. γ. *viridulum* (= *G. viridulum,* Brid.) et δ. *gracillimum* (= *G. gracillimum,* Br. Germ.); *Rontignon* et *Pau.*

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This species varies exceedingly in the length of the leaves and in the form of their apices. A small variety on walls at Pau has the leaves shortly ligulate, mostly widest above the middle, and often quite rounded at the summit. In the village of Rontignon, which is seven or eight miles higher up the banks of the Gave de Pau, the varieties γ. and δ. grow intermixed, both having the leaves for the most part subacute. All the forms observed in the Pyrenees have far wider and shorter leaves than specimens I have received from the Alps, and I never once met with the form considered by Bruch and Schimper as the type of the species. [Confer 'Bryol. Europæa,' monogr. *Gymnost.* p. 7; where however it is said by mistake that my specimens were gathered "in schisto micaceo;" but it is nevertheless true that the mortar used in the neighbourhood of Pau, being made of lime mixed with the sand of the Gave de Pau, contains particles of mica, granite, &c. brought down from the mountains by this stream and its tributaries.]

303. *G. rupestre,* Schwgr. Suppl. t. 10; H. et T.! Musc. Brit. ed. 2. p. 19. t. Suppl. 2; M. P. 238.

Hab. Z_{1-2} in rupibus humidis tam calcareis tam argillaceo-schistosis, frequens. *Pierrefitte*; *Penticosa*; *Gavarnie,* &c. *V. d'Eynes* (Arnott!).

304. *G. curvirostrum,* Hedw. Musc. Frond. ii. t. 24; Br. Europ. *l. c.* p. 8. t. 7, 8; M. P. 240.

Hab. Z_{2-3} in rupibus humidis præcipue argillaceo-schistosis. P. occ. circa thermas *les Eaux Bonnes* et *les Eaux Chaudes* dictas. P. c. circa *B. de Luchon,* locis *Esquierry* et *Lac de Séculéjo**.

* In the Supplement to the 1st volume of Bridel's 'Bryologia Universa' the two following gymnostomous mosses are described, and said to grow near Dax:—

"*Gymnostomum homomallum,* Brid.; caule erecto simplicissimo, foliis lanceolatis acutis integerrimis supremis e nervo crasso excurrente longissime subulatis secundis, thecæ oblongæ operculo conico-rostrato incurviusculo.

"Circa *Dax* ad terram cæspitosam legit D. Grateloup; clar. Candolleus communicavit.

"A *Didymodonte homomallo,* quem habitu proxime refert dignoscitur statura duplo minore, caule simplicissimo, foliorum supremorum longitudine et areolatione, præprimis stomate nudo."—Br. Univ. i. p. 757.

May not this be *Trichostomum subulatum,* Bruch, with which it agrees well enough except as to the peristome, which may have been overlooked?

"Entosthymenium, Brid.

"*Caracter essentialis.* Stoma externe nudum; interne membrana angusta annulari margine tandem lacinulata instructum. Calyptra cuculliformis. Theca subinæqualis, apophysata.

"*E. tristichum,* Brid.; caule erecto ramosiusculo, foliis patentibus siccitate incurvis subtristichis ovato-lanceolatis acutiusculis solidinerviis, thecæ ovatæ subinclinatæ apophysi basilari parva.

"In Gallia australi circa *Dax* D. Grateloup detexit; Candolleus communicavit. Cæspitibus fastigiatis vivit.

"*Barbulam* e toto habitu, foliorumque forma et areolatione diceres, at

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58. *Anœctangium*, Schwaegr.

305. *A. compactum*, Schwgr. Suppl. t. 11; Br. Europ. *Anœctangium*, p. 5. t. 1; M. P. 241.

Hab. Z_2 P. c. ad rupes irroratas circa *Bagnères-de-Luchon*, locis *Lac de Séculéjo*, *Cascade du Cœur* et *Superbagnères*: plerumque fertile.

Tribus 24. ZYGODONTEÆ, Bryol. Europ.

59. *Zygodon*, Hooker et Taylor.

306. *Z. Mougeotii*, B. et S.! Br. Europ. fasc. iv. p. 7. t. 1; M. P. 242.

Hab. Z_{1-2} per Pyrenæos sylvaticos, rupestris, frequens sed rarissime fructificans; juxta lacum *Séculéjo* capsulis deoperculatis, 22 Sept. 1845, legi.

307. *Z. viridissimus*, Smith, Fl. Brit. p. 1224 (sub *Dicrano*); Br. Europ. *l. c.* p. 7. t. 1; M. P. 243.

Hab. Z_1 ad arbores circa *Pau* et *Bagnères*, plerumque sterilis.

308. *Z. conoideus*, Schwgr. Suppl. 2. p. 138. t. 137; Br. Europ. *l. c.* p. 8. t. 2.

Hab. Z_1 P. c. in truncis populi vetustis juxta pagum *Pouzac*! (Philippe!). *Estafforte, Hte. Garonne* (Brondeau in hb. Dufour).

In these specimens the leaves are often nerved throughout, and the nerve even excurrent into a short mucro. The sporular sac rises *above the mouth of the capsule* before it is divided into cilia, which are two cellules in breadth near the base, *sometimes sixteen in number*, the intercalary cilia being far shorter than the others.

Tribus 25. PTYCHOMITRIEÆ.

60. *Ptychomitrium*, Bryol. Europ.

309. *P. polyphyllum*, Dicks. Crypt. fasc. 3. p. 7 (sub *Bryo*); Br. Europ. *Ptychom.* p. 4. t. 1; M. P. 244.

Hab. Z_{1-3} in saxis graniticis regionum sylvaticarum: e vulgatissimis.

310. *P. incurvum*, Muehl. Cat. Plant. Amer. Sept. p. 98 (sub *Grimmia*). *Weisia incurva*, Schwgr. Suppl. 2. p. 51. t. 116. *Grimmia Muehlenbergii*, Brid. Br. Univ. i. p. 181. *Ptychomitrium pusillum*, B. et S.! Br. Europ. *Ptychom.* p. 5. t. 1; Sullivant! Musci Allegh. n. 135.

Hab. Z_1 P. occ. in muro prope *Oloron*. Cæspitem unicum inveni.

membrana annularis et apophysis proprium genus declarant."—Br. Univ. i. p. 761.

I confess myself unable to form a probable guess as to what this moss really is: the possessors of the Bridelian herbarium must decide.

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Leaves composed of *two layers of cellules* except near the base; the margins often thickened (=2 cellules); the nerve=3–5 cellules; the obtuse apex *cucullate*.

Tribus 26. Orthotrichaceæ, Bryol. Europ. (ex parte).

61. *Orthotrichum*, Hedwig.

Obs. This genus includes but few rupestral species, and only two of these (*O. anomalum* and *cupulatum*) have their normal station on calcareous rock. Of the species which inhabit the bark of trees, it is remarkable that those with an *exserted* capsule (*Ulota*, Bridel) prefer *young oaks*, while those with an *immersed* capsule prefer *poplars*.

§ 1. (= Ulota, Bridel.)

311. *O. crispulum*, Bruch. Mst. in Brid. Br. Univ. i. p. 793; Br. Europ.! *Orthotrichum*, p. 23. t. 12; M. P. 245.

Hab. $Z_{1\ inf.}$ ad arbores in sylvis Pyren. occidentalium, locis *Jurançon*, *Gan*, &c.

312. *O. crispum*, Hedw. Musc. Frond. ii. t. 35; Br. Europ.! *l. c.* p. 23. t. 12; M. P. 246.

Hab. Z_{1-2} ad arborum truncos. In monte *Lhieris* peristomio interno 16-ciliato occurrit.

313. *O. Bruchii*, Brid. Br. Univ. i. p. 744 (sub *Ulota*). *O. coarctatum*, Br. Europ. *l. c.* p. 21. t. 11 (non P. Beauv.).

Hab. Z_1 P. occ. ad arborum truncos in valle *d'Ossau* prope *Gan*, rarissime!

314. *O. Hutchinsiæ*, Smith, E. Bot. t. 2523; H. et T.! Musc. Brit. p. 131. t. 21; Br. Europ. *l. c.* t. 10; M. P. 247.

Hab. $Z_{1\ sup.}$ ad saxa granitica per Pyrenæos occidentales, in vicinia *Cauterets* et *Pierrefitte* præcipue.

315. *O. coarctatum*, Pal. Beauv. Prodr. p. 80. *O. Ludwigii*, Schwgr. Suppl. t. 51; Grev.! Scot. Cr. Fl. t. 133; Br. Europ. *l. c.* t. 4; M. P. 248.

Hab. Z_{1-2} P. occ. et c. ad fruticum ramulos, frequens. *Mte. Verte*; *V. du Lys*; *Labassère*, &c.

316. *O. anomalum*, Hedw. Musc. Frond. ii. t. 37; Br. Europ. p. 10. t. 3; M. P. 249.

Hab. Z_1 in saxis calcareis; in arborum truncis ad viam quæ ducit a pago *Loudervielle* ad *Port de Peyresourde* in Pyr. centralibus.

§ 2. (=Orthotrichum, Bridel.)

317. *O. leiocarpum*, B. et S. Br. Europ. *l. c.* p. 28. t. 15; M. P. 250. *O. striatum*, Schwgr. Suppl. t. 54 (vix Hedwigii); H. et T. Musc. Brit.! p. 128. t. 21.

Hab. Z_1 ad arborum corticem, frequens.

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318. *O. Lyellii,* Hook. et Tayl.! Musc. Brit. p. 76. t. 22; Br. Europ. *l. c.* p. 27. t. 16.
Hab. Z_1 in arboribus, rarius. P. occ. *V. d'Ossau.* P. c. *B.-de-Bigorre.*

319. *O. diaphanum,* Schrad. Spicil. Fl. Germ. p. 69; Br. Europ. *l. c.* t. 14; M. P. 251.
Hab. Z_{0-1} ad arbores præcipue populos.

320. *O. patens,* Bruch in Brid.; Br. Europ.! *l. c.* p. 17. t. 7.
Hab. $Z_{1-inf.}$ ad populorum truncos, rarissimum. P. occ. *Pau*; *Jurançon.* P. c. *B.-de-Bigorre* (Philippe!).

321. *O. stramineum,* Hsch.; Brid. Br. Univ. 1. p. 789; Br. Europ.! *l. c.* p. 23. t. 13; M. P. 252.
Hab. Z_{0-2} ad truncos, vulgatissimum. *Oloron*; *Cauterets*; *V. de Campan,* &c.
"Var. 2, collo capsulæ longioris sporangium æquante, ciliis 8, vaginula vix pilosa;" M. P. 253.—*Hab.* ad populorum truncos in valle *d'Ossau* prope *Louvie.*

I am not certain that the authors of 'Bryol. Europ.' would not refer this to their *O. fastigiatum* (*l. c.* t. 8): the vaginula is however always slightly hairy.

322. *O. pallens,* Bruch in Brid. Br. Univ. i. p. 788; Br. Europ. *l. c.* p. 24. t. 13. "*O. stramineum,* var. 3. foliis capsulisque tenerioribus, vaginula nuda, ciliis semper 16;" M. P. 254.
Hab. Z_1 P. occ. ad arbores campestres prope *Louvie* et *Cauterets.*

323. *O. speciosum,* Nees in Sturm. Deut. Fl. Crypt. hft. 16; Br. Europ.! *l. c.* p. 19. t. 9; M. P. 255.
Hab. Z_1 ad frutices in sepibus, rarissimum. P. occ. *Luz.* P. c. *Vallée d'Aure*; *B.-de-Bigorre* (Philippe!).

324. *O. affine,* Schrad. Spicil. Fl. Germ. p. 67; Br. Europ. *l. c.* p. 17. t. 7; M. P. 256.
Hab. Z_{0-2} ad arborum truncos.

325. *O. tenellum,* Bruch in Brid. Br. Univ. i. p. 786; Br. Europ.! *l. c.* t. 6; M. P. 257.
Hab. Z_{0-1} ad arborum truncos. P. occ. *St. Sever*; *Pau.* P. c. *B.-de-Bigorre.*
Var. capsula *emersa,* subclavata; calyptra *magna,* capsulam totam obtegente, straminea.—*Hab.* prope *St. Sever.*

326. *O. pumilum,* Schwgr. Suppl. t. 50; Br. Europ.! *l. c.* p. 14. t. 5; M. P. 258.
Hab. $Z_{1\ inf.}$ P. occ. et c. ad populos prope *Pau* et *B.-de-Bigorre.*

327. *O. rupestre,* Schleich.; Schwgr. Suppl. t. 53; Br. Europ.!

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l. c. p. 19. t. 9; M. P. 259. *O. rupincola,* Funck.; Grev.! Scot. Cr. Fl. t. 105.

Hab. Z_{1-2} in saxis præsertim graniticis, frequens. *Les Eaux Chaudes*; *Pierrefitte*; *V. du Lys,* &c. In arborum cortice supra *Cauterets.*

328. *O. urnigerum,* Myrin Cor. Flor. Upsal. p. 71; Br. Europ.! *l. c.* p. 29. t. 17; M. P. 260.

Hab. Z_1 in arboribus et saxis graniticis prope *Pierrefitte* et *Cauterets,* socio *Leskea nervosa*: rarissime.

329. *O. Sturmii,* H. et H. Bot. Zeit. 1819, p. 89; Br. Europ. *l. c.* p. 9. t. 2.

Hab. P. or. *St. Martin du Canigou* et in convalle *d'Eynes* (Montagne, *l. c.*).

330. *O. cupulatum,* Hoffm. Deutsch. Flor. ii. p. 26; Br. Europ. *l. c.* t. 2; M. P. 261.

Hab. Z_1 in saxis calcareis, haud vulgatum. *Les Eaux Bonnes,* &c.

331. *O. obtusifolium,* Schrad. Crypt. Germ. p. 14; Br. Europ. *l. c.* p. 13. t. 1; M. P. 262.

Hab. $Z_{1\,inf.}$ P. occ. et c. circa *Pau* et *B.-de-Bigorre* in populorum truncis.

Tribus 27. Encalypteæ, Bryol. Europ.

62. *Encalypta,* Schreber.

332. *E. streptocarpa,* Hedw. Sp. Musc. t. 10; Br. Europ. fasc. 4. p. 15. t. 7; M. P. 295.

Hab. Z_1 in calce arenato murorum et ad terram calcaream in sylvis omnium Pyrenæorum, plerumque fertilis. *Forêt de Lhieris*; *Les Eaux Bonnes,* &c.

333. *E. rhabdocarpa,* Schwgr. Suppl. t. 17; Br. Europ. *l. c.* p. 13. t. 6; M. P. 296.

Hab. Z_{3-5} in rupibus schistosis, rarissime. P. occ. *V. de Combascou,* ut et in summo montium jugo loco *Port de Cauterets.* P. c. *Lac Lehou.*

334. *E. ciliata,* Hedw. Sp. Musc. p. 61; Br. Europ. *l. c.* p. 10. t. 3; M. P. 297.

Hab. Z_2 in rupibus umbrosis, ad viarum latera, &c. passim.

335. *E. vulgaris,* Hedw. Sp. Musc. p. 60; Br. Europ. *l. c.* p. 9. t. 2.

Var. β. *gymnostoma,* Br. Europ.—*Hab.* Z_1 in solo calcareo prope *Les Eaux Chaudes,* rarissime.

Var. γ. *mutica,* Brid. et Br. Europ.; M. P. 298.—*Hab.* ad viarum latera prope *Gavarnie.*

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Var. *e.* Br. Europ. (=*E. pilifera*, Funk).—*Hab. Forêt de Transoubdt*, socio *Grimmia anodonte* (Philippe !).

336. *E. commutata*, N. et H. Br. Germ. 2. t. 15 ; Br. Europ. ! *l. c.* p. 8. t. 1 ; M. P. 299.

Hab. Z_{2-4} in terra denudata rupium. P. occ. *Mt. Lizé.* P. c. *Gavarnie ; Lac Lehou ; Lac de Séculéjo.*

337. *E.* ? *ligulata*, Spruce in Musci Pyr. n. 331 : dense cæspitosa ; caule erecto, simplici dichotomove, tenui, *fragili* ; foliis confertis, e basi suberecta patulo-subreflexis, *lineari-spatulatis, obtusis, acute carinatis*, margine inferiori recurvis, *nervo paulo ante apicem evanido*, areolatione præter ad basin (ubi laxiori) minutissima, obscura.

Hab. $Z_{1\ sup.}$ in rupibus humidis præsertim ophiticis, locis *Labassère, Superbagnères* et *Gorge de Cauterets.*

Planta tota tenerrima, ¼–1 unc. longitudine. *Caulis* dense foliosus et inter folia radiculis propriis pallidis tenuissimis ramosis flexuosis vestitus. *Folia* lurido-rufescentia, chlorophyllo destituta, terminalibus pallido-viridibus chlorophyllosis exceptis, hic illic confertiora majora subcomantia, e basi angusta sensim et usque ad ⅘ folii latiora, longitudine tota = 4–5 latitudinem ubi latissima, apice ipso rotundato-obtusa, *carinata, inferne complicata*, superne subexplanata ; *cellulæ omnes subparallelogrammæ, parietibus crassis, inferiores magnæ* longitudine = 2 lat., *superiores* 4–6*ies breviores* subæquilateræ, *versuum* 3–4 *marginalium crassiores* et ex eo *folia inferiora rufo-marginata, superiora pallido-marginata.*

Tribus 28. HEDWIGIACEÆ, Bryol. Europ.

63. *Hedwigia*, Ehrhart.

338. *H. imberbis*, Smith, E. Bot. t. 2237 (sub *Gymnostomo*) ; M. P. 263. *Hedwigidium imberbe*, Br. Europ. p. 3. t. 1.

Hab. Z_1 P. occ. ad saxa granitica prope *Laruns.* P. c. in rupibus schistosis prope *Pouzac* et *Gazos* (Philippe !).

339. *H. ciliata*, Hdew. Musc. Frond. i. t. 40 ; Br. Europ. *Hedwigia*, p. 5. t. 1, 2 ; M. P. 264.

Hab. Z_{1-4} in saxosis, ubique vulgata. "*Pic du Midi vers* 2600 *mètres d'altitude*" (Desmoulins).

Tribus 29. GRIMMIACEÆ, Bryol. Europ.

64. *Schistidium*, Bridel (ex parte).

340. *S. apocarpum*, L. Sp. Pl. p. 1579 (sub *Bryo*) ; Br. Europ. ! p. 7. t. 3, 4 ; M. P. 265.

Hab. Z_{0-5} in saxis, passim.

341. *S. confertum*, Funk, Moos-Tasch. t. 12 (sub *Grimmia*) ; Br. Europ. *l. c.* p. 7. t. 2. *S. apocarpum* var. *confertum*, M. P. 266.

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Hab. Z_{1-5} P. c. in rupibus humidiusculis graniticis et argillaceo-schistosis. *Vallée de Castelloubon. Port de Bénasque*! (Arnott!). *B.-de-Bigorre* et *Labassère* (Philippe!).

†*S.* ? *recurvifolium*, Wils. in litt. ad R. S.

Hab. $Z_{1\ sup.}$ P. occ. in rupibus argillaceo-schistosis vallis *d'Ossau* supra *Béost*, sterile.

This moss has been found in a barren state in several parts of England. It approaches very closely to *S. apocarpum*, yet it may be a *Tortula* or a *Didymodon*.

65. *Coscinodon*, Sprengel.

342. *C. cribrosus*, Hedw. Musc. Frond. iii. t. 31 (sub *Grimmia*); M. P. 267. *Coscinodon pulvinatus*, Spreng.; Br. Europ. *Coscinodon* (cum ic.).

Hab. Z_{1-2} P. occ. in rupibus schistaceis prope *Pierrefitte*. P. c. locis similibus vallis *Castelloubon* loco *les Scieries de Gazos*, etiam in mortario murorum ad pagum *Asté*, ubi am. Philippe detexit. P. or. locis *Bellegarde* et *Concampa* (Arnott!).

"Folia nonnunquam *trinervia*, i. e. plicis lateralibus e strato duplici cellularum constitutis." M. P. *l. c.*

On the mountain (*Superbagnères*) which rises at the back of the town of *Bagnères-de-Luchon*, I gathered a *Coscinodon*, which differs considerably in the foliage from my specimens of *C. cribrosus*, but the fruit is too immature to afford any character. The leaves are smaller, *erect at the base, then widely spreading*, and finally *incurved at the summit*, strongly keeled, but *quite destitute of plicæ*: *those of the perichætium remarkably large*, three times the length of the stem-leaves.

66. *Grimmia*, Ehrhart.

Obs. The species of this genus are in the Pyrenees perhaps more conspicuous than those of any other. *G. orbicularis* and *crinita* were observed only on calcareous formations, and the latter only on mortar in walls: both in exposed sunny situations*, not rising to the region of coniferous trees. *G. sulcata* was noticed only on argillaceous schist. The only species which never descend into the woody region are *G. sulcata* and *atrata*. The following species are subalpine or alpine: *G. patens, elatior, funalis, spiralis, incurva, Doniana, alpestris* and *ovata*; but nearly all of these are occasionally seen below the coniferous region, or towards the upper limit of Z_1. The following species are characteristic of the lower mountains, namely *G. leucophæa* on granite or schist, and *G. orbicularis* on limestone. The region of coniferous trees (Z_2, Z_3) is marked by the frequent occurrence of *G. ovata, commutata* and *elatior*. The essentially alpine

* In the Eastern Pyrenees, Dr. Arnott observed walls covered on the *south* side with *G. orbicularis*, and on the *north* side with *G. pulvinata*.

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species (above-mentioned) are too sparingly distributed to impart any peculiarity to the vegetation.

343. *G. anodon,* Br. Europ. *Grimmia,* p. 8. t. 1.
Hab. Z_2 P. c. *V. du Lys* in saxis graniticis; in rupibus micaceo-schistosis sylvæ *Transoubât* supra *Oubat* (Philippe!).

344. *G. crinita,* Brid. Mant. p. 32; Br. Europ.! *l. c.* p. 10. t. 2; M. P. 268.
Hab. Z_{0-1} P. occ. in muris prope *Pau.* P. c. ad casarum muros in pago *Pouzac* prope *B.-de-Bigorre*! (Philippe!).

Specimens communicated by Dr. Arnott from Montpellier have the perichætial leaves alone piliferous, even the terminal ones of the sterile branches being muticous. In this character it precisely agrees with *G. plagiopodia,* Hedw.; yet the calyptra is dimidiate, not mitriform as in that species.

345. *G. pulvinata,* L. Sp. Pl. p. 1586 (sub *Bryo*); Br. Europ. *l. c.* p. 12. t. 4; M. P. 269.
Hab. Z_{0-1} in muris rupibusque umbrosioribus.

346. *G. orbicularis,* B. et S.! Br. Europ. *l. c.* p. 13. t. 5; Wilson! in E. Bot. Suppl. t. 2888; M. P. 270. *G. africana,* Arnott! Disp. Meth. p. 21; Duby, Bot. Gall. p. 574.
Hab. Z_{0-1} in muris rupibusque calcareis apricis circa *Pau* et *B.-de-Bigorre. Pyrénées Orientales* (Arnott!). Circa Burdigalam (Grateloup!).

347. *G. spiralis,* H. et T. in Drumm. Musc. Scot. ii. n. 29; Grev.! Scot. Cr. Fl. t. 203; Br. Europ. *l. c.* p. 14. t. 7; M. P. 271.
Hab. Z_{2-4} P. occ. in saxis graniticis circa *Cauterets,* locis *Mt. Lizé, Source de la Raillère* et *Lac de Gaube,* pulcherrime! P. c. *Lac Lehou* (Philippe!). P. or. *V. d'Eynes* (Arnott!).

348. *G. torta,* H. et Nees, Br. Germ. ii. t. 22. *G. torquata,* Hook.; Grev.! Scot. Cr. Fl. t. 199. *G. spiralis* var. *torta,* M. P. 272.
Hab. Z_{2-3} in rupibus udiusculis. P. occ. secus rivuli *Gave de Marcadaou* ripas, socio *Zygodonte Mougeotii.* P. c. *Lac de Séculéjo.*
Zygodon species vult cel. Schimper.

349. *G. incurva,* Schwgr. Suppl. 1. § 1. p. 9; § 2. t. 97. "*G. trichophylla,*" M. P. 273.
Hab. Z_{1-2} P. occ. in saxis graniticis vallis *Combascou,* ut et prope *Pierrefitte.*

350. *G. trichophylla,* Grev. Scot. Cr. Fl. t. 100; Br. Europ. *Grimmia,* p. 16. t. 9.
Hab. P. or. ad *St. Antoine de Galamus* in montibus Corbariis (Montagne, *l. c.*).

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351. *G. funalis,* Schwgr. Suppl. 1. § 1. p. 150. t. 37 (sub *Trichostomo*); Br. Europ. *Grimmia,* p. 17. t. 11.

Hab. $Z_{1\ sup.}$ P. c. in rupibus argillaceo-schistosis, locis *Labassère* et *V. de Castelloubon.*

352. *G. elatior,* B. et S.! Br. Europ. *l. c.* p. 17. t. 10; M. P. 274.

Hab. Z_{2-3} in saxis graniticis secus rivulos Pyrenæorum totorum, sed nusquam copiosa. *Cauterets. Penticosa. Ruisseau d'Ardalos,* &c. *Mont Louis* et *Seo d'Urgel* (Arnott!). In summo monte *Canigou* (Montagne!).

353. *G. patens,* Dicks. Crypt. fasc. 2. p. 6 (sub *Bryo*); Br. Europ. *l. c.* p. 18. t. 10 *bis.*

Hab. Z_{2-4} ad rupes madidas regionum sylvaticarum alpinarumque. *Pont d'Espagne. Port de Cauterets,* &c.

354. *G. commutata,* Hueben. Musc. Germ. p. 185; Br. Europ.! *l. c.* p. 25. t. 19; M. P. 276. *Dicranum ovale,* Hedw. Sp. Musc. p. 140.

Hab. Z_{2-3} in rupibus graniticis secus rivulos. *Gave d'Ossau. Pont d'Espagne. Penticosa. Mont Louis* (Arnott!).

355. *G. leucophæa,* Grev.! Act. Soc. Wern. iv. t. 6; Br. Europ. *l. c.* p. 23. t. 20; M. P. 277.

Hab. Z_1 in saxis graniticis schistosisque montium humiliorum, frequens. *Cauterets. B.-de-Bigorre. Seo d'Urgel* (Arnott!). In tepidariis *Vernet les bains* (Montagne!).

356. *G. ovata,* W. et M. Iter Suec. t. 2; Br. Europ.! *l. c.* p. 21. t. 17; M. P. 278.

Hab. $Z_{1\ sup.-3}$ in saxis graniticis Pyrenæorum totorum sylvaticorum.

Var. δ. *cylindrica,* Br. Europ. *l. c.* t. 18; M. P. 279. *G. cylindrica,* Br. Germ. *Hab.* ad lacus Séculéjo ripas.

357. *G. Doniana,* Smith, Fl. Brit. p. 1198; H. et T.! Musc. Brit. p. 72. t. 13; M. P. 280. *G. obtusa,* Schwgr.; Br. Europ. *l. c.* p. 20. t. 13.

Hab. Z_{2-3} P. c. in saxis graniticis vallis *Castelloubon,* loco *les Scieries de Gazos*; *Vallon du Peyrosse* (Philippe!); *Mt. Maladetta* (DeC. in Fl. Française).

Var. *curvula,* M. P. 281. *Grimmia curvula,* Br. Europ. *l. c.* p. 11. t. 3. *Hab. V. de Castelloubon,* cum forma normali; *Gorge de Labassère*; *Port de Bénasque* (Arnott!).

"Pedicellus in statu etiam normali *curvulus* est;" M. P. *l. c.*

358. *G. alpestris,* Schleich. Pl. exsic. Helvet.; Br. Europ.! *l. c.* p. 27. t. 15; M. P. 282.

Hab. Z_3 P. occ. circa *Cauterets,* in saxis graniticis ad marginem

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lacus *Lac de Gaube* dicti, etiam in monte *Lizé* et secus ripas *Gave de Marcadaou*. P. c. *derrière le Pic Montaigu à côté de Gazos* (Philippe!). P. or. *Mt. Canigou* (Arnott!).

359. *G. sulcata*, Sauter, Br. Europ.! *l. c.* p. 27. t. 16; M. P. 283.

Hab. Z_4 in rupibus udis argillaceo-schistosis loco *Port de Bénasque*. In summis Pyrenæis sine loco designato (Endress in Br. Europ.).

Folia in parte superiore e serie duplici triplicive cellularum constituta.

360. *G. atrata*, Mielich. Bot. Zeit. 1819, p. 85; Br. Europ.! *l. c.* p. 30. t. 24; M. P. 284.

Hab. Z_4 P. c. in rupium schistosarum fissuris ad marginem lacus dict. *Lac Lehou*; *Pic de la Peyre* (Philippe!); *Port de Bénasque* (Arnott!). P. or. *Pic de Crabère* (Arnott!).

67. *Racomitrium*, Bridel.

361. *R. fasciculare*, Schrad. Spicil. Fl. Germ. p. 61 (sub *Trichostomo*); Br. Europ. *Racomitrium*, p. 8. t. 4; M. P. 285.

Hab. Z_{2-3} in rupibus udis regionis arborum conifer., frequens. *Pont d'Espagne*. *V. de Lesponne*, &c.

362. *R. lanuginosum*, Hedw. Musc. Frond. iii. p. 3. t. 2 (sub *Trichostomo*); Br. Europ. *l. c.* p. 11. t. 6.

Hab. Z_{1-2} per Pyrenæos, fere semper sterile, fertile tamen juxta *les Eaux Bonnes* legit am. Southby.

According to the 'Bryologia Europæa' this species is never fertile in the plains, but in England I have gathered well-fruited specimens on moors in the vale of York, at an elevation of not more than 50 feet above the sea.

363. *R. canescens*, Hedw. Musc. Frond. iii. t. 3 (sub *Trichostomo*); Br. Europ. *l. c.* p. 12. t. 7; M. P. 286.

Hab. Z_{1-2} in sylvis terrestre et rupestre, haud raro fertile.

364. *R. sudeticum*, Funk. Crypt. n. 670 (sub *Trichost.*); Br. Europ.! *l. c.* p. 7. t. 1; M. P. 287. *Trichostomum microcarpon*, Hedw.; H. et T.! Musc. Brit. p. 107. t. 19.

Hab. Z_{2-4} in rupibus graniticis schistosisque humidiusculis. P. c. *V. de Castelloubon*; *Ruisseau d'Ardalos*; *Route du Lac Lehou* (Dufour!); *Base du Pic du Midi* (Philippe!). P. or. *Cambrédazes* (Arnott!).

Var. minus, habitu *Grimmiæ ovatæ*; foliis plerumque muticis; *dentibus peristomii* 16 *subintegris bifidisve*, nunquam usque ad basin partitis. *Hab.* in loco alpino *Port de Bénasque* dicto.

The teeth of the peristome are united at the base into a membrane

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rising above the mouth of the capsule, by which this variety is distinguished from *Grimmia ovata*. The basal cellules of the leaf have three or four marked indentations on each side, and the margins are slightly incrassated upwards.

365. *R. heterostichum*, Hedw. Musc. Frond. 2. t. 25 (sub *Trichostomo*); Br. Europ. *l. c.* p. 9. t. 2 *bis* et 3; M. P. 288.
Hab. $Z_{1\ sup.-3}$ in saxis rupibusque, vulgatissimum.

366. *R. protensum*, Al. Braun; Br. Europ. *l. c.* p. 6, t. *Drypt.* 2; M. P. 289. *Dicranum aciculare* γ, Turn.! Musc. Hibern. p. 67.
Hab. Z_2 in rupibus udis secus rivulos. P. occ. *Mte. Verte.* P. c. *Labassère*; *V. de Castelloubon*; *Forêt de Transoubât.*

367. *R. aciculare*, Hedw. Musc. Frond. iii. t. 33 (sub *Dicrano*); Br. Europ. *l. c.* p. 6, t. *Drypt.* 1; M. P. 290.
Hab. Z_2 in saxis rivulorum, frequens.

Tribus 30. Ripariaceæ, Bryol. Europ.

68. *Cinclidotus*, Pal. Beauv.

368. *C. riparius*, W. et M. Bot. T. p. 120 (sub *Trichostomo*); Br. Europ.! *Cinclidotus*, p. 10. t. 2; M. P. 291.
Hab. Z_{1-2} P. occ. et c. (*forma typica*) in rivulo *Gave d'Ossau* dicto prope *Gabas.*
Var. β. *terrestris*, Br. Europ.! *l. c.* p. 11. t. 2; M. P. 292.—*Hab.* ad saxa arborumque radices prope *Narcastet* et *Jurançon. Montgaillard*, secus ripas fl. *Adour* (Philippe!).

369. *C. fontinaloides*, Hedw. Musc. Frond. 3. t. 14 (sub *Trichostomo*); Br. Europ. *l. c.* p. ? t. 3; M. P. 293.
Hab. Z_{1-2} in saxis demersis rivulorum.

370. *C. aquaticus*, Hedw. Musc. Frond. 3. t. 11 (sub *Hedwigia*); Br. Europ.! *l. c.* p. 8. t. 1; M. P. 294.
Hab. Z_1 P. c. prope *B.-de-Bigorre*, in flum. *Adour* ut et in rivulo juxta monasterium *Médous*, saxis demersis adhærens: planta ♂ sola. *Rivière du Hérault*, *Vaucluse* (Arnott!).

Tribus 31. Fontinaleæ, Bryol. Europ.

69. *Fontinalis*, Dillenius, Linnæus.

371. *F. antipyretica*, L. Sp. Pl. p. 1571; Br. Europ. *Fontinalis*, t. 2.
Hab. Z_1 in aquis fluentibus Pyrenæorum, haud vulgaris. P. occ. prope *les Eaux Bonnes* (Dufour!) etiam juxta pagum *Bétharam* pulchre fructiferum (Grateloup!).

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Tribus 32. FISSIDENTEÆ, Bryol. Europ.

70. *Fissidens*, Hedwig.

372. *F. grandifrons*, Brid. Suppl. Musc. i. p. 170 (1806); Br. Europ. fasc. 17, *Fissidens*, p. 11. t. 6; M. P. 311. *Dicranum adiantoides* β. *atrovirens*, DeCand. Fl. Fr. *D. palmiforme*, Ramond, Pyr. ined. (1815).

Hab. Z_1 per totos Pyrenæos in rupibus tophaceis irroratis, præcipue secus cataractas: semper sterilem vidi. Prope *B.-de-Bigorre*, in vallecula *Elysée Cottin* dicta, floribus masculis detexerunt Philippe et R. S.

Flores masculi medio caule positi, in foliorum duplicatura nidulantes, raro proxime sequentes foliis caulinis autem 2–3 inanibus inter singula folia florigera, iis *F. adiantoidis* similes, 5–8-phylli. *Folia floralia* propria 2–3, ovata, concava, dorso haud alata apice tamen laminula parva (= ¼ folii) instructa. *Antheridia* 4–9, oblongo-cylindrica, paraphysibus destituta.

373. *F. adiantoides*, L. Sp. Pl. p. 1588 (sub *Hypno*); Br. Europ. *l. c.* p. 10. t. 5; M. P. 312.

Hab. Z_{1-3} in scaturiginosis pratisque humidis, frequens.

374. *F. taxifolius*, L. Sp. Pl. p. 1587 (sub *Hypno*); Br. Europ. *l. c.* p. 9. t. 4; M. P. 313.

Hab. Z_{0-1} in sylvaticis, terrestris.

375. *F. osmundioides*, Hedw. Sp. Musc. t. 40; Br. Europ. *l. c.* p. 8. t. 3; M. P. 314.

Hab. Z_2 P. c. in saxis irroratis cataractæ dict. *Cascade du Cœur.*

376. *F. incurvus*, Schwgr. Suppl. t. 49; Br. Europ.! *l. c.* p. 6. t. 1; M. P. 315.

Hab. $Z_{1\ inf.}$ P. c. in terra arenosa. P. occ. prope *Gélos*. P. c. prope *B.-de-Bigorre.*

Along with the usual state of the species at Gélos grows a delicate form which I am undecided whether or not to regard as a distinct species. It has the calyptra conico-subulate, *quite entire, barely sheathing the operculum.* The antheridia are enclosed in a bud springing from the base of the stem, precisely as in *F. taxifolius*: I have not seen one terminating a branch, as in *F. incurvus.*

377. *F. fontanus*, Schimper; M. P. 316. *F. incurvus* var. *fontanus*, Br. Europ. *l. c.* t. 1. f. β. 1.

Hab. Z_1 ad saxa emersa rivuli *Adour de Lesponne* prope *B.-de-Bigorre.*

378. *F. bryoides*, Hedw. Musc. Frond. iii. t. 29; Br. Europ. *l. c.* t. 2; M. P. 317.

Hab. Z_{0-1} ad terram arenosam et argillaceo-arenosam.

"Var. *rivularis*, foliis 12–20 jugis, *elongatis, limbo valde incras-*

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sato circumductis, capsula plerumque horizontali ;" M. P. 318.—*Hab. B.-de-Bigorre* in lapidibus rivuli supra fontem *la fontaine ferrugineuse* dictum.—An species propria? (*F. Pyrenaicus,* mst.)

71. *Conomitrium,* Montagne.

379. *C. Julianum,* Savi, Poll. Fl. Veron. iii. p. 385 (sub *Fontinali*); Mont. in Ann. des Sc. nat. viii. p. 250. t. 4. *Octodiceras Julianum,* Brid. Br. Univ. ii. p. 678; Br. Europ. fasc. 17 (cum icone).

Hab. Z_0 P. occ. *Dax,* in fontibus tepidis (Dufour! Grateloup!).

Tribus 33. Leucobryaceæ, C. Muell. Syn. Musc.

72. *Leucobryum,* Hampe in Linnæa, 13. p. 42.

380. *L. glaucum,* L. Sp. Pl. p. 1582 (sub *Bryo*); C. M. Syn. Musc. p. 74. *Dicranum glaucum,* Hedw.; Schwgr. Suppl. t. 48; M. P. 204.

Hab. Z_{0-1} in sylvis Pyrenæorum humiliorum ut et Agri Syrtici, truncos Castanearum decurtatarum cariosos pulcherrime vestiens.

Nothing can exceed the beauty of this moss when in a state of luxuriant fructification, as it is seen in the forests at the foot of the French Pyrenees. There it spreads over fallen timber and the decaying trunks of polled chestnut-trees, and the rich brown capsules, each half-enveloped in its silvery calyptra, stud its swelling and snowy tufts as with so many gems. The structure of its leaves is very remarkable and appears not to have been well understood by bryologists. I consider the leaves to be as *truly nerved* as those of *Dicranum longifolium, Campylopus fragilis,* e. a., where the existence of a nerve is now generally admitted. The nerve, in fact, occupies nearly the whole of the leaf, with the exception of a narrow limb on each side, of one cellule in thickness and 10 or 12 cellules in breadth near the base, which disappears about half-way up the leaf, or a little beyond where the margins begin to be strongly inflexed: this is quite analogous to what is observed in the species just referred to. [See Plate XII., where figures 1 and 2 represent transverse sections of the leaf, the former made near the apex and the latter near the base; *a b* the nerve, *a a* and *b b* the limb on each side: magnified about 240 times.] The nerve consists of only two layers of cellules, towards the apex, and on the axis down to the very base; but in its lower half one or two additional layers are imposed on both the upper and under surfaces, the greatest thickness being about midway between the axis and the limb on each side (fig. 2), in consequence of which the leaf is usually somewhat channeled on the back towards the base. The cellules composing the nerve are elongated prisms, quadrangular on the longitudinal and 5–7-gonal on the transverse section. Their *internal* walls exhibit large circular perforations (see figs.), one in each end and 1–3 in each side of every cellule. I have been unable to detect any openings whatever in the *external* walls of

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those cellules which constitute the upper and under surfaces of the nerve; the foramina, which appear in great numbers on regarding a leaf with a tolerably high power, being proved, by accurately adjusting the lens, and especially by cutting various sections of the leaf, to belong, *not to the external surface*, but to the walls separating contiguous cellules; so that, while there is ample provision for *a free communication between the cellules of the nerve*, there is none whatever for their communicating with the external medium, or at least none but what exists in all cellular tissue, which is at variance with what we observe in the genus *Sphagnum*, to which *Leucobryum* is often (and not inaptly) compared, as to its mode of growth and general aspect*. In the cellules of the limb I have been unable to detect either external or internal perforations. A transverse section is seen to be traversed by a tolerably regular medial line, which indicates the junction of the two principal layers of cellules, and is marked by a series of *lozenge-shaped openings* at the cellular angles. These openings are the sections of *slender chlorophyllose cellules, running in lines from the base to the apex of the leaf*, and having no communication by pores with the perforated tissue in which they are interposed. [See fig. 3, which represents part of a longitudinal section through one of these series of chlorophyllose cellules, magnified about 600 times.] These at once suggest the slender vermiform cellules similarly interposed in the prosenchymatous tissue of the *Sphagna*, of which the office is precisely the same, namely to contain the grains of chlorophyll†.

Tribus 34. Sphagnaceæ, C. Mueller.

73. *Sphagnum*, Dillenius.

381. *S. acutifolium*, Ehrh. Crypt. exsicc. n. 72; Schwgr. Suppl. t. 5; M. P. 325.

Hab. Z_2 P. c. in rupibus humidis vallis *Lesponne* et secus lacum *Séculéjo*.

382. *S. cuspidatum*, Ehrh. Crypt. 251; Schwgr. Suppl. t. 6.

Hab. Z_0 P. occ. in turfosis prope *Dax* (Grateloup!).

383. *S. squarrosum*, W. et M. It. Suec. t. 2. f. 1; Schwgr. Suppl. t. 4; M. P. 326.

Hab. Z_{2-3} P. occ. et c. in rupibus humidis, locis *Lesponne*, *Labassère* et *Mt. Crabioules*.

384. *S. cymbifolium*, Ehrh. Hann. Mag. 1780, p. 235; M. P. 327. *S. obtusifolium*, Ehrh.; H. et T. Musc. Brit. p. 13. t. 4.

* It is worthy of remark, that the cellules of some *Sphagna*, e. g. *S. cymbifolium, communicate laterally with each other by means of pores in the adjacent walls.*

† Since this account was drawn up, *Leucobryum glaucum* has appeared in the 'Bryologia Europæa' under the name of *Oncophorus glaucus*, and a description is given of its structure differing I believe in some slight particulars from what is here stated.

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Hab. Z_{0-1} P. c. in rupibus humidis faucis *Gorge de Labassère* dictæ. P. occ. in palude turfaceo montis *Goursi*. Nusquam alias in montibus Pyrenæis mihi notum! In turfosis Agri Syrtici (Grateloup!).

385. *S. compactum*, Brid. Suppl. Musc. i. p. 18; Schwgr. Suppl. t. 3; M. P. 328.

Hab. Z_0 P. occ. in Agro Syrtico, loco *Landes de Mugriet*, copiose.

Tribus 35. ANDRÆACEÆ, C. Mueller.

74. *Andræa*, Ehrhart.

386. *A. Rothii*, W. et M. Cr. Germ. p. 386. t. 11; Schwgr. Suppl. t. 106; M. P. 329.

Hab. Z_{2-4} P. c. in rupibus graniticis juxta lacum *Séculéjo*, necnon in valle *Castelloubon*; in rupibus micaceis ad marginem lacus *Lehou* (Philippe!).

Florescentia monoica: *flores fœminei* constanter *trigyni*; *flores masculi polyandri, paraphysibus claviformibus* prædíti. *Folia* in dimidio superiori plerumque (in varietate *Grimsulana* præcipue) *e seriebus cellularum duabus* conflata.

M. Philippe's specimens have the terminal leaves distinctly repando-dentate, and thinner than in the ordinary form of the species.

387. *A. rupestris*, L. Sp. Pl. p. 1601 (sub *Jungermannia*); Hedw. Sp. Musc. t. 7; M. P. 330.

Hab. Z_{2-4} P. c. cum priore; etiam in rupibus dict. *Chaos* prope *Gavarnie*.

Florescentia monoica: *flores fœminei di-trigyni*; *flores masculi tetrandri, paraphysibus carentes*, nonnunquam in planta propria pseudo-alares.

Ordo HEPATICÆ.

Tribus 1. JUNGERMANNIEÆ, Nees ab E.

Hemicyclum 1. *Foliosæ*.

Subtribus 1. GYMNOMITRIA, N. ab E.

1. *Gymnomitrium*, N. ab E.

1. *G. concinnatum*, Lightf. Fl. Scot. ii. p. 786 (sub *Jungermannia*); Gottsche, Lindbg. et Nees, Syn. Hepat. p. 3; H. P. 1.

Hab. Z_{2-4} in rupibus humidis P. occ. et c., locis *Pont d' Espagne* et *Port de Bénasque*.

2. *Sarcoscyphus*, Corda.

2. *S. adustus*, N. ab E. Europ. Leberm. i. p. 120 (sub *Gymnomitrio*); Syn. Hep. p. 4.

Hab. Z_1 P. c. ad saxa in monticulo *Olivet* prope *B.-de-Bigorre*, socio *S. Funckii*.

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The habit of this species, the difficulty with which it is distinguished from small forms of *S. Funckii*, and above all the structure of the perianth, demand that it should be removed to the genus *Sarcoscyphus*. I find in all cases a *true perianth* present, the origin of which is derived from the union of two leaves quite concealed by the perichætial leaves, with which it is *concrete* for nearly half its length: it is pale and of very delicate texture (cellules three times as large as those of the perichætium), erose and inflexed at the summit and sometimes 2-lipped. The perianth of *S. Funckii* is formed on the same type. In some true *Gymnomitria* (e. g. *G. concinnatum*) I observe within the perichætium two leaves (rarely only one) which are much shorter, wider and more tender than the perichætial leaves, and unequally trifid with toothed segments; but these are neither *connate* with each other nor *concrete* with the perichætium, hence they cannot be called a *perianth*, although obviously supplying the place of one. Still it would perhaps be more logical to consider *Gymnomitrium* as only a section or subgenus of *Sarcoscyphus*. I am happy to add that Dr. Gottsche quite concurs with me in the removal of *Gymnomitrium adustum* to *Sarcoscyphus*.

3. *S. Funckii*, W. et M. Bot. p. 422 (sub *Jungermannia*); Syn. Hep. p. 8; H. P. 3.

Hab. Z_{0-1} locis umbrosis ad terram saxaque. P. occ. *St. Sever*; *Jurançon*; *Val de Jéret*. P. c. *Bagnères-de-Bigorre*; *Vallée du Lys*.

4. *S. emarginatus*, Ehrh. Beitr. iii. p. 80 (sub *Jungermannia*); H. P. 2; Hook. Br. Jung. t. 27. *Sarcoscyphus Ehrharti*, Syn. Hep. p. 7.

Hab. Z_{0-5} ad rupes humidas Pyrenæorum totorum; ad terram in sylvis Agri Syrtici.

3. *Alicularia*, Corda.

Obs. The two European species of this genus are both found in the Pyrenees, where *A. compressa* attains its southernmost recorded limit.

5. *A. compressa*, Hook. Brit. Jung. t. 58 (sub *Jung.*); Syn. Hep. p. 12; H. P. 4.

Hab. Z_1 P. occ. locis scaturiginosis faucis *Gorge de Cauterets* dictæ.

6. *A. scalaris*, Schrad.; Hook. Br. Jung. t. 61 (sub *Jung.*); Syn. Hep. p. 10; H. P. 5.

Hab. Z_{0-5} in rupibus, ad terram, &c., a planitie usque ad summos Pyrenæos ascendens.

4. *Southbya*, nov. gen.*

Char. essent. Perianthium terminale, involucro *emersum*, cum

* To no one can I with more propriety dedicate a new genus of Pyrenean Cryptogamia than to Dr. Southby, my companion in so many interesting excursions in those mountains, and a gentleman accomplished in almost every branch of natural history.

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eodem *ab inferiori parte concretum*, primitus cylindricum dein *a lateribus subcompressum*, breviter *bilabiatum*, labiis subconniventibus, haud plicatum *suturis* tamen *duabus*, altera ventrali altera dorsali, notatum.

Genus inter *Alicularian* et *Jungermannias integrifolias* medium locum tenens.

7. *S. tophacea.* (*Jungerm. tophacea* nobis in Hep. Pyren. n. 23.)

Hab. $Z_{1\ inf.}$ in imis Pyrenæis occidentalibus, supra pagos *Jurançon* et *Gélos* in rupibus topha obtectis, cæspites *Weisiæ verticillatæ* marcidos haud raro vestiens; immo ad muros subhumidos in ipsa urbe *Pau*. E Lusitania sine nomine missa in herbario beati Taylor nuperius vidi.

Plantæ pusillæ, tenerrimæ, $\frac{1}{4}$–$\frac{3}{4}$ unc. longæ, cæspitosæ, matrice arcte adfixæ, instar *Jg. bicrenatæ* suaveolentes. Caulis simplex, rarius furcatus, e perianthii basi innovationes 1 vel 2 ante capsulæ maturationem involucro inclusas semper proferens, prostrata, apice fertili tamen assurgens, longis radiculis pallidis radicans. *Folia* pallide viridia, *inferiora* semiverticaliter affixa, subopposita, angulis dorsalibus subcontiguis nonnunquam connatis, reflexo-patula, ovata vel ovali-oblonga, apice rotundata, integerrima; *superiora* verticalia, plerumque conferta, *basi dorsali per paria conjuncta*, apice margineque ventrali solis reflexa, raro apice retusa, obtuse emarginata vel angulato-repanda; *involucralia* caulinis superioribus simillima, paulo majora, apice eroso-denticulata, cum perianthio ad basin concreta. *Amphigastrium* involucrale, ovato-lanceolatum, obtusum, nonnunquam adest; cæterum caulis omnino examphigastriata est. *Perianthium* terminale involucrum subæquans (in plantis minoribus densifoliis nonnunquam involucrum vix æquat, in elatioribus autem sparsifoliis involucrum plus minus superat), e foliis duobus plus minus alte connatis conflatum et ex eo compressum bilabiatumque, labiis subconniventibus, post capsulæ emissionem haud raro collapsis, ore tametsi apertum, eroso-denticulatum rarius subincisum. *Textura* foliorum et perianthii est laxa, subpellucens, e cellulis majoribus in reti typice sexangularibus, limitibus angustis, intercalaribus nullis, granis chlorophyllicis magnis haud numerosis. *Calyptra* obovata, pallida, membranacea. *Capsula* fusca, subglobosa, tenera, laxe areolata, ad basin usque 4-valva aut, valvula una alterave bifida, 5–6-valva, pedicello pallido exserta. *Semina* grandiuscula, globosa, granulosa. *Elateres* torti, bispiri, apicibus subobtusi.

Florescentia dioica videtur. *Plantæ masculæ* fœmineis tenuiores, tota fere longitudine staminiferæ. *Folia perigonialia* minora, semper per paria connata, basi ventricosa, apice patula, stamina singula binave brevi-pedicellata circumscissim rumpentia in axillis foventia.

Plate XIV. Fig. 1, *plantæ nat. magn.*; fig. 2, *surculus sterilis a dorso visus*; fig. 3, *planta fertilis al atere visa*; fig. 4, *apex plantæ masc.*; fig. 5, *folia inferiora*; fig. 6, *folia superiora*; fig. 7, *apex folii*; fig. 8, *perianthium cum involucro a dorso visum*; fig. 9, *perianthium*

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(*effœtum et collapsum*) *a latere, cum folio involucrali arcte retroflexo: omnia aucta.*

Obs. A first glance at this pretty species reminds one of *Alicularia scalaris*, but important differences are disclosed on a nearer examination; still, an extensive comparison of apparently cognate forms has convinced me that the *Alicularieæ* are in truth its closest allies. If a perianth of *Southbya* and one of *Alicularia scalaris* be vertically divided, and laid side by side, the relationship will be clearly obvious: the involucre is alike in both, and in both is it concrete below with the perianth, which also is formed on the same type in each. Could we now suppose the perianth of *A. scalaris* to be a little elongated, or that of *Southbya* to be a little abbreviated, the sole important difference would vanish. In reality, small forms of *Southbya* have the perianth sometimes barely visible beyond the involucre.

There is also a section of *Jungermannia*, consisting entirely of exotic species, which approaches *Southbya*, though more remotely. The type of this section is *Jg. turgescens*, Tayl. et Hook. fil. in Crypt. Antarctica, p. 38, t. 64, which has the *perianth slightly compressed laterally and truncate, but quite discrete from the involucre.* The habit too is widely different, the *stems being much divided*, scarcely radiculose, the *leaves very concave*, with a *minute guttulate areolation* (the cellules round, separated by wide interstices), and there are *bifid stipules* present. *Alicularia strongylophylla*, T. et H. *l. c.* p. 34, t. 62, has *the perianth exactly as in Jg. turgescens*, quite free and sometimes *twice as long as the involucre*; the chief differences being the *less concave leaves* and the wider areolation (yet still equally guttulate): *it is therefore not an Alicularia*, and with *Jg. turgescens* might well constitute a new genus, of which other species are probably *Jg. æquata* and *humilis* of the same authors. Possibly their *Alicularia occlusa* and the *Jungermannia Liebmanniana* of Lindenberg and Gottsche may go into the same genus, but of these I have not seen specimens. These species seem all intermediate between *Southbya* and the true *Jungermanniæ*, which they approach through *Jg. Taylori* and its allies.

On another side, *Southbya* has some affinity with a small group, of which *Jungermannia hyalina* is the European representative; but these differ from it in the *red radicles*, and in the *perianth* being *contracted* and *numerously plicate* towards the mouth.

Subtribus 2. Jungermannideæ, N. ab E.

5. *Plagiochila*, Nees et Mont.

8. *P. asplenioides*, L.; Hook. Br. Jung. t. 13 (sub *Jung.*); Syn. Hep. p. 49.

Hab. Z_{0-3} in umbrosis per montes totos. In Pyrenæis tres præprimis formas innotavi: sunt—

1. *minor*; H. P. 6: caule gracili, squamis minutissimis (ne amphigastriis dicam) in ventre adsperso vel nudo; foliis subse-

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cundis, margine dorsali valde reflexis et ex eo ad *P. porelloidem* appropinquans.—*Hab.* in sylvis Pyren. centralium.

2. *major*; H. P. 7: foliis maximis, confertis, patulis; squamis caulinis obviis, plerumque amorphis, nonnullis bifidis, nonnullis lineari-digitatis.—*Hab.* in valle *du Lys*.

3. *heterophylla*, N. ab E.? Syn. Hep. p. 50; H. P. 8: caule flagellifero, squamis minutis subulatis prædito; foliis repandis, retusis emarginatisve.—*Hab. Val de Jéret* et *Bois de Gouerdère*, in rupibus umbrosissimis.

9. *P. Pyrenaica*, Spruce in Hep. Pyren. n. 9: *caule horizontali in planum ramoso*; foliis imbricatis, plano-distichis aut adscendentibus, subconvexis, ovato-subquadratis, *apice variis*, oblique unidentatis, truncato-bidentatis, denticulatis, retusis vel obtusis omninoque integerrimis: involucralibus majoribus, subverticalibus, arcte adpressis, ovato-linguæformibus, repandis subdenticulatisve; *perianthio obovato-oblongo*, compresso, incurvo, *ore spinuloso-dentato* hinc plerumque fisso.

Hab. Z_{1-2} ad rupes humidiusculas Pyren. centralium (*Superbagnères*; *Grottes de Bédat* prope *B.-de-Bigorre*; *V. de Gazos*) et occidentalium (*Mont Goursi*; *Gave de Valentin*).

Caules intertexti, fertiles $\frac{1}{2}''$–$1''$, steriles $2''$–$3''$ longi. *Folia* ramorum fertilium plerumque integra retusave, sterilium contra vario modo incisa rarius integra et integerrima. Retis areolæ 6-angulares, subcontiguæ. Color viridi-olivaceus sicco statu in lutescentem vergens. *Perianthium* superne ampliatum. Capsulas maturas non habui.

Florescentia monoica: perigonia spiciformia: folia lobulo involuto spinuloso vel laciniato-dentato stamina obtegente prædita.

Plagiochila interrupta, N. ab E. Syn. Hep. p. 48, planta plerumque humilior, *folia semper integerrima* et *perianthium ore repando-crenulatum* habet. *P. porelloides* N. ab E., *caulibus adscendentibus* et *foliis gibbis, flaccidis, integerrimis*, sat superque distincta.

Although I have lately had Dr. Gottsche's sanction for retaining *Plagiochila Pyrenaica*, I think it not improbable that it may one day be proved a variety of *P. interrupta*, a striking one certainly, and perhaps confined to the Pyrenees. The *Plagiochilæ* are so liable to variation in the toothing of the leaves, that it is scarcely possible to suppose all the generally received species genuine. I have seen no specimens of *P. porelloides* which I can safely separate from *P. asplenioides*.

6. *Scapania*, Lindenberg.

10. *S. compacta*, Roth, Fl. Germ. iii. p. 375 (sub *Jung.*); Syn. Hep. p. 63. *Jung. resupinata*, Hook. Br. Jung. t. 23.

"Var. 1, foliis in duplicatura sæpius alatis, ala repando-dentata, lobo ventrali *convexo*;" H. P. 10.—*Hab.* Z_0 in Agro Syrtico circa *St. Sever* et Aquas Tarbellicas. "*Collines de St. Pandelon, de Tercis*;" Grateloup in 'Cryptogamie Tarbellienne.'

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"Var. 2, foliis ut plurimum inæqualiter bilobis, lobo ventrali *concavo*;" H. P. 11.—*Hab.* Z_1 P. c. in arenosis supra pagum *Gerde* prope *B.-de-Bigorre*.

Possibly a distinct species from the foregoing. The segments of the leaves are *subtrapezoidal, quite entire*, the *sinus gibbous*, the areolation rather closer and subguttulate. I have, however, only the sterile plant.

11. *S. undulata*, L. Sp. Pl. p. 1598 (sub *Jung.*); Hook. Br. Jung. t. 22; Syn. Hep. p. 65; H. P. 12.

Hab. Z_{0-3} in umbrosis humidis ad saxa. *Pont d'Espagne. Mt. Crabioules. V. de Courbettes* (Philippe!). "In Agro Syrtico prope *Dax*" (Grateloup, *l. c.*).

12. *S. nemorosa*, L. Sp. Pl. p. 1598 (sub *Jung.*); Hook. Br. Jung. t. 21. f. 1–4; Syn. Hep. p. 68; H. P. 13.

Hab. Z_{0-3} locis sylvaticis, frequens.

13. *S. umbrosa*, Schrad. Samml. ii. p. 5; Hook. Br. Jung. t. 24; Syn. Hep. p. 69; H. P. 14.

Hab. Z_{2-3} P. occ. ad saxa prope pontem dict. *Pont d'Espagne*. P. c. in monte *Crabioules* ad ligna putrida. E rarioribus.

14. *S. apiculata*, Spruce in Hep. Pyren. n. 15; caule brevi simplice, infra perianthium innovante, e basi flexuosa repente adscendente; foliis pallidis vel fuscescentibus, infimis minimis, bidentatis, vix complicatis, superioribus majoribus, *usque ad ⅓ bifidis*, conduplicatis, *lobis oblique rhomboideis, apiculatis, subrepandis, haud arcte adpressis*, ventrali plerumque concavo, dorsali paulo minori, convexo, margine tamen sæpius reflexo, sinu depresso, *guttulato-areolatis*, cellulis discretis; involucralibus conformibus, deflexis; perianthio oblongo-clavato, compresso, subdeflexo, ore repando.

Hab. Z_2 supra ligna putrida in sylvis editioribus. P. occ. *Vallée de Béost*. P. c. *Cascade du Cœur* prope *B.-de-Luchon*.

S. umbrosa, proxima, *colore specioso albo roseove*, caule subramoso, *foliis homomallis, argute serratis, usque ad ⅔ bifidis*, lobo dorsali ventrali 3–4plo minori, diversa est. *S. curta* N. ab E. *foliorum forma, perianthio ciliato*, &c. distinctissima.

7. *Jungermannia*, Linnæus.

Obs. Of the *Jungermanniæ* observed in the Pyrenees, *Jg. acuta* and *Wilsoniana* have their normal station on calcareous rock; *Jg. exsecta, ventricosa, curvula, incisa, divaricata, reclusa, curvifolia* and *setacea* were gathered *only on decayed wood*; the remainder are chiefly glareal or viatical, and some of them were also occasionally seen on decayed wood. It will be remarked that those species which in the Pyrenees occupy semiputrid trunks are the same which inhabit heaths

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on the plains and hills of the north of Europe. The species which approaches nearest the snow-line is *Jg. julacea.*

§ 1. Complicatæ, Syn. Hep.

15. *J. albicans,* Linn. Sp. Pl. p. 1599; Syn. Hep. p. 75.
Hab. Z_{0-4} terrestris et rupestris, fere ubique.

16. *J. obtusifolia,* Hook. Br. Jung. t. 26; Syn. Hep. p. 76; H. P. 16.
Hab. Z_{0-2} in viarum cavarum parietibus solo arenoso. P. occ. *St. Sever; Cauterets.* P. c. *B.-de-Bigorre; Port de Portillon.*

17. *J. exsecta,* Schmid. Ic. p. 241. t. 62; Hook. Br. Jung. t. 19; Syn. Hep. p. 77; H. P. 17.
Hab. Z_2 in truncis putrescentibus. Fructiferum legi in monte *Pic de Ger,* P. occ.

The fructification in my specimens differs somewhat from the description in 'Synopsis Hepaticarum'; it is as follows:—Involucral leaves with very acute segments, otherwise not differing from the cauline ones, with the exception of the innermost, which is rather shorter and terminated by several unequal apiculate teeth: it is accompanied by a lanceolate very acute stipule. Perianth oblongo-cylindrical, compressed, with four obtuse angles or plicæ, the mouth ciliate.

§ 2. Integrifoliæ, Syn. Hep.

18. *J. Schraderi,* Mart. Fl. Erlang. Cr. p. 180. t. 6. f. 55; Syn. Hep. p. 83; Sullivant! Musci Allegh. n. 235; H. P. 18.
Hab. Z_2 P. c. ad saxa in umbrosissimis secus cataractam *Cascade du Cœur* dictam.

19. *J. hyalina,* Lyell in Hook. Br. Jung. t. 63; Syn. Hep. p. 92; H. P. 21.
Hab. Z_{1-2} P. c. in rupibus secus rivulos, rarius ad terram. *Vallée de Castelloubon; Gorge de Labassère,* &c.

20. *J. nana,* N. ab E.; Syn. Hep.! p. 91; H. P. 20.
Hab. Z_{1-3} per Pyrenæos occ. et centr. in viis cavis, sed nusquam copiosa. *Col de Louvie; Bois de Lagaillaste; Esquierry,* &c.

21. *J. Genthiana,* Hueben. Hep. Germ. p. 107; Syn. Hep. p. 94. "*J. crenulata,* Sm., var. foliis caulium fertilium *minus compresso-contiguis, vix marginatis, perianthio* (*haud compresso*) *obovato,* submucronato, *plicato-4-angulo, angulis papilloso-alatis;*" H. P. 19.
Hab. Z_{1-2} P. c. ad viarum parietes. *Bois de Gerde* prope *Bagnères,* pulcherrime! *Port de Portillon,* &c.

The characters quoted above from 'Hepaticæ Pyrenaicæ' correctly indicate the differences of this plant from *Jg. crenulata,* and I am now quite satisfied of their being specific.

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22. *J. crenulata,* Sm.! E. Bot. t. 1463; Syn. Hep. p. 90.
Hab. Z_{0-1} in arenosis turfosisque Agri Syrtici et P. centr., rarior. *St. Sever; B.-de-Bigorre.*

23. *J. sphærocarpa,* Hook. Br. Jung. t. 74; Syn. Hep. p. 93; H. P. 22.
Hab. Z_{1-2} P. occ. et c. locis similibus ac *Jg. hyalina* (n. 19). *Gorge de Cauterets; Labassère; Forêt de Transoubât* (Philippe!).

The black crumbling schist at *Labassère,* on which *Jg. sphærocarpa* and *hyalina* occur intermixed, is precisely of the same nature as the alum-shale in Eskdale near Whitby, Yorkshire, and it is remarkable that there also the same two species grow together in considerable quantity.

24. *J. cordifolia,* Hook. Br. Jung. t. 32; Syn. Hep. p. 95; H. P. 24.
Hab. Z_{1-3} P. c. in fontibus profundis secus ripas flum. *Adour,* in pagi *Asté* conspectu; necnon in humidis montis *Crabioules.*

Dr. Gottsche informs me that this species does not differ from *Jg. tersa* γ. *rivularis* of German authors.

25. *J. riparia,* Tayl.! in Annals of Nat. Hist. xii. p. 88; Syn. Hep. p. 97; H. P. 25.
Hab. Z_{1-3} in rupibus irroratis, rarius ad terram, frequens.

This species is often mixed with *Jg. acuta,* but it is not, like that species, confined to calcareous rock.

26. *J. pumila,* With. Arrang. iii. p. 866; Hook. Br. Jung. t. 17.
Hab. Z_2 P. c. ad saxa in sylva *Bois de Sajust* dicta: aliubi haud visa.

I cannot distinguish authentic specimens of *Jg. Zeyheri,* Hueben, from this. Both are remarkable for the perianth terminating in a cone, which is not plicate, but has *a furrow on each face,* that on the dorsal being most evident, and along this the dehiscence takes place for the emission of the capsule.

§ 3. Bidentes, Syn. Hep.

27. *J. acuta,* Lindbg.; Syn. Hep.! p. 103. *J. Muelleri,* N. ab E.; Syn. Hep.! p. 99; H. P. 26, 27, 28*.
Hab. Z_{1-2} locis calcareis subhumidis terrestris et saxatilis, rarius lignicola, per Pyrenæos frequentissima.

In 'Hepaticæ Pyrenaicæ' I gave three forms of this species, scarcely differing from each other except in *size*; the third form (No. 28) attains a length of 3 or 4 inches, and forms closely-tufted

* *Jg. acuta* and *Muelleri* are now ascertained to be absolutely identical, the former having the stipules nearly or altogether obsolete.

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patches on the nearly vertical faces of rocks watered by the spray of rivulets in the upper part of the *Vallée d'Ossau* and the *Gorge de Labassère*. I there considered *Jg. Bantriensis*, Hook. Mst., which I gathered abundantly in Teesdale in 1843, as belonging to the same species, but at Dr. Gottsche's suggestion I have reconsidered this opinion, and I now think that the two may in all cases be safely distinguished. The differences are these:—in *Jg. Bantriensis* the leaves are always more or less erect, and in the large form they are *secund*, the two rows being contiguous by their upper surfaces, which I have never seen to be the case in *Jg. acuta*; they are also less undulate, *the sinus not gibbous*, though from the incurvation of the apices there is sometimes the appearance of it. Perianth when *young* (and in all stages when *unfertile*) *pyriform or broadly clavate*; while *the perianth of Jg. acuta*, in all states and at every age, even when quite short and half-developed, is of equal width from a little above the base to the summit, i. e. *cylindrical**.

28. *J. Lyoni*, Tayl. ! Trans. Bot. Soc. p. 116. t. 7; H. P. 29.

Hab. $Z_{1\ sup.-2}$ inter muscos ad saxa sylvarum, haud rara. *Val de Jéret*, &c.

The authors of 'Synopsis Hepaticarum' had surely never seen correct examples of this when they referred it to *Jg. socia*, N. ab E., and their description of it, "foliis laciniis obtusis," is quite at variance with specimens I possess from Messrs. Lyon and Taylor. It is singular that its near ally, *Jg. barbata*, Schreb., one of the commonest species in our mountains, should never have been observed in the Pyrenees. Dr. Grateloup indeed mentions it in his list as growing at the extreme western angle, "in montibus petrosis *Cambo* prope Bayonam," but without seeing his plant I dare not say that it is different from *Jg. Lyoni*†.

29. *J. Wilsoniana*, N. ab E.; Syn. Hep. p. 103; H. P. 30. *J. turbinata*, Wils. ! in E. Bot. Suppl. t. 2744. *J. inflata*, E. Bot. t. 2512.

Hab. Z_1 in rupibus calcareis subhumidis. *Gélos* prope *Pau*. *B.-de-Bigorre*.

30. *J. ventricosa*, "Dicks."; Hook. Br. Jung. t. 28; Syn. Hep.

* The plant alluded to at the close of my description of *Jg. Bantriensis* ('Annals,' 1844) as gathered by Mr. Ralfs at Dolgelley, is possibly distinct from both the above. The three perianths in my possession are all subtriangular on the section, the dorsal face being the narrowest, and in one perianth the two lateral angles are winged and toothed. If it must be referred to one of the two, it will be to *Jg. acuta*, as it has the gibbous sinus of the leaves characteristic of that species. Mr. Wilson, to whom I am indebted for the specimens, has called it *Jg. culearis*.

† Dr. Grateloup mentions in his list "*Jg. setiformis*, Ehrh. Hab. in sylvis ad terram et ad arb. truncos. *Dax*. *Lésperon*. *Saubagnac*;" but as I searched for it in these stations without success, I cannot include it in my enumeration. It would be indeed remarkable to find in the *plains* of the south of Europe a species which grows most profusely in Lapland (Wahlenberg), and which when it extends farther south is uniformly *alpine*.

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p. 108. *J. porphyroleuca,* N. ab E.; Syn. Hep. p. 109. "*J. alpestris,* Schleich.;" H. P. 31.

Hab. Z_{2-3} ad terram et truncos putridos. P. c. *Ruisseau d'Ardalos.* P. occ. *Val de Jéret.*

I am doubtful whether Dickson meant this species by his *Jg. ventricosa,* Fasc. 2. p. 14. He gives no figure, but cites figures of Micheli and Dillenius, which are certainly little like our plant, and adds, "*Folia in nostra profundius fissa,* quam in figuris Michelii et Dillenii depinguntur," which is still more at variance with the species as figured by Hooker. Dr. Gottsche informs me that when this plant grows on rotten wood, where it often assumes a purplish tinge (as in some of my Pyrenean specimens), it is the *Jg. porphyroleuca* of Nees. In 'Hepaticæ Pyrenaicæ' I had considered this form as possibly *Jg. alpestris,* Schleich., but specimens of the latter from Dr. Gottsche differ in having the leaves *roundish-ovate* (not quadrate as in *Jg. ventricosa*), the *sinus small,* and the *segments unequal, oblique.*

Var. *minor.* "*Jg. excisa,* Dicks.? var. foliis e basi cuneata ovato-quadratis obovatisve, marginibus inflexis, sinu triangulari lunatove, involucralibus bifidis, integerrimis; perianthio oblongo, ore obtuse plicato;" H. P. 32.

I believe I am correct in regarding this a minute form of *Jg. ventricosa*; the leaves are usually more deeply cloven, the sinus triangular, the segments often divaricating; and yet stems of the large, ordinary form may be found having the same characters.

31. *J. curvula,* N. ab E.; Syn. Hep. p. 115; H. P. 33.

Hab. Z_2 P. occ. in valle *Combascou* supra ligna putrida.

32. *J. capitata,* Hook. Br. Jung. t. 80; H. P. 34. *J. excisa β. crispata,* Hook. *l. c.* t. 9. ff. 2, 11, 12. *J. intermedia,* Lindbg. Hep. Europ. p. 83; Syn. Hep.! p. 116.

Hab. Z_{0-2} P. occ. in arenosis *Sti. Sever.* P. c. in truncis putridis secus cataractam *Cascade du Cœur* dictam: rarior.

I am quite of opinion that the original name of Hooker should be retained for this species. Lindenberg was evidently not aware that his own *Jg. intermedia* and Hooker's *Jg. capitata* were forms of one species; from his description it is probable that he did not clearly distinguish it from some forms of his *Jg. bicrenata,* as he cites for it Hooker's tab. Suppl. 2 (Synopsis, p. 11), which exactly resembles Ekart's figures of *Jg. bicrenata,* and agrees well with specimens of the gemmiferous state of that species in my possession.

33. *J. bicrenata,* Lindbg. Hep. Eur. p. 82; Syn. Hep.! p. 115; H. P. 35, 36.

Hab. Z_{0-1} in arenosis ad viarum parietes. *St. Sever. Pau. Bagnères.*

Dr. Gottsche has pointed out to me *the remarkable scent of this species,* resembling that of *Jg. acuta* and *Bantriensis,* and *quite want-*

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ing in Jg. capitata; by this character, by the deeply and acutely cloven leaves, and especially by the *guttulate areolation*, *Jg. bicrenata* may always be safely distinguished.

I fear *Jg. excisa*, Dicks. Crypt. 3. p. 11. t. 8. f. 7, will have to be entirely erased from the list of Hepaticæ. I have spent much time in the attempt to ascertain what it really is, but without success; formerly I thought it might be *Jg. bicrenata*, especially as there is a rude attempt in Dickson's figure to represent the guttulate areolation, characteristic of that species; but the larger size, the *branched stem*, and especially the *narrow shallow sinus of the leaves*, seem to disprove such a supposition. Very lately I consulted the Smithian herbarium in the hope of finding an original specimen from Dickson, but even the name does not seem to exist there. I have examined a multitude of specimens from various parts of the British Isles, sent under the name of "*Jg. excisa*:" these belong in nearly equal quantities to three species, viz.:

1. *J. ventricosa*, forma minor = *J. excisa*, Hook. t. 9 (excl. var. β).
2. *J. bicrenata*, Lindbg. = *J. excisa* gemmifera, Hook. t. Suppl. 2.
3. *J. capitata*, Hook. = *J. excisa* β. *crispata*, Hook. t. 9. ff. 2, 11, 12 = *J. intermedia*, Lindbg.

It is exactly the same with specimens of "*Jg. excisa*" from the continent of Europe, nor have I ever seen a specimen agreeing with the descriptions that have been given of this species. Hooker says of *Jg. excisa*, "foliis *profunde* emarginatis;" of *Jg. ventricosa*, "foliis *obtuse* emarginatis:" Lindenberg says of *Jg. excisa*, "Differt . . . . . foliis *minus profunde* incisis:" lastly, the authors of 'Synopsis Hepaticarum' describe *Jg. excisa*, "foliis . . . *sinu profundo obtuso* excisis." From these and similar discrepancies, I cannot help concluding that these distinguished hepaticologists had under their eyes small forms of *more than one* of the three species above-cited when they drew up their descriptions of the supposed "*Jg. excisa*, Dicks." Dr. Gottsche has even admitted to me that he is unable to determine *Jg. excisa* if given to him without a name. He adds, "what I have received from my English and German friends under the name of *Jg. excisa* differ so much from each other, that I confess not to know the species."

34. *J. incisa*, Schrad.; Hook. Br. Jung. t. 10; Syn. Hep. p. 118; H. P. 37.

Hab. Z_{0-2} in truncis prostratis cariosis Pyrenæorum, frequens. "Ad terram humidam ac in rupibus muscosis circa Aquas Tarbellicas" (Grateloup, *l. c.*).

The leaves of this species are normally *conduplicate*; the lowest unequally bidentate with diverging segments, as in many *Scapaniæ*; the upper with very unequal lobes, *the dorsal lobe triangular, undivided, appressed to the stem, the ventral lobe bifid*: both either entire at the margins or with a few spinulose teeth. This is the typical structure, but, very rarely, the dorsal lobe is also bifid, and sometimes the

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ventral lobe is not bifid, but cut at the margin into several unequal spinulose teeth: sometimes it is trifid. In all cases the complication is discernible, notwithstanding the thickness of the stem, and even when the lobes are squarrosely spreading (as is seen also in some true *Scapaniæ*, e. g. in varieties of *S. nemorosa*). Hooker's figs. 3 and 4, tab. 10, show this quite distinctly.

35. *J. minuta*, Crantz; Hook. Br. Jung. t. 44; Syn. Hep. p. 120; H. P. 38.

Hab. Z_2 P. occ. ad rupes, haud vulgata, locis *Val de Jéret* et *Montagne Verte*.

§ 4. Bicuspides, Syn. Hep. (= Trigonanthus, nob. in hb.).

Obs. This very natural group, resembling *Lophocolea* in the nature of its fructification, may well constitute a separate genus, for which I propose the name *Trigonanthus*. Many of the species are stellatedly branched, and, in all, the branches seem to have the same origin (*e dorso*). In those species which have *the stems exstipulaceous*, there are always *involucral stipules* present, e. g. in *Jg. bicuspidata*, where the *lowest stipule* is lanceolate, the *second* obcordate, the *third* obcordate with a deeper notch, the *fourth* (next the perianth) irregularly trifid, and the perianth itself is composed of a *fifth* stipule connate with two opposite leaves: hence *its trigonous form* and obvious affinity to that of *Lophocolea*. The capsule is always *oblong*, and often remarkably so.

36. *J. divaricata*, Smith! in E. Bot. t. 719. *J. Starkii*, Hb. Funck; Syn. Hep. p. 134; H. P. 39.

Hab. Z_2 P. c. supra ligna putrida in sylva *Forêt de Transoubât* dicta, non procul a *B.-de-Bigorre*.

I have examined the original specimen of *Jg. divaricata*, figured in 'English Botany,' from "Heaths near Holt, Nov. 1798, Rev. Mr. Francis": it possesses very distinct *stipules* (!), and agrees in other respects with what has been called *Jg. Starkii* by German authors, and by Dr. Taylor *Jg. stellulifera*. My own herbarium contains a great many forms, some stipulaceous throughout the length of the stems, others only towards the apex, and some altogether without stipules. Between all these I can draw no certain line of demarcation, and if there be more than one species there must be several. In every form the leaves are nearly of the same width as the stem, roundish in outline or a little quadrate, the segments mostly acute and either diverging or connivent (when the leaves appear subcomplicate), the cellules mostly 4-sided with rounded angles and discrete by narrow interstices. In all there is the same peculiarity of the involucral leaves being united so as to form one or two exterior perianths; all have these leaves toothed and the real perianth more or less ciliated at the mouth.

37. *J. Francisci*, Hook. Br. Jung. t. 49; Syn. Hep. p. 133; H. P. 40.

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Hab. Z_0 P. occ. ad fossarum parietes in ericetis Agri Syrtici, loco *Landes de Mugriet.*

38. *J. dentata,* Raddi in Mem. della Soc. Ital. di Mod. xix. p. 32; Syn. Hep. p. 143.

Hab. Z_0 P. occ. *St. Sever,* in arenosis, sociis *J. bicrenata* et *Trichostomo subulato.*

This differs somewhat from the description in 'Synopsis Hepaticarum.' The stems are closely creeping, mostly simple, rarely with one branch. Leaves brownish, crowded and capitate on the flowering shoots, scarcely at all complicate, cloven mostly to below the middle, spinuloso-dentate, the cellules rather small but discrete (not with such wide interstices as in *Jg. Turneri*). Stipules, on the lower part of the stem, minute, irregular in form, usually lanceolate or subulate and toothed; towards the apex larger, those of the involucre oval (= ½ leaf) and as well as the involucral leaves deeply toothed or even laciniate.

The stems of *Jg. Turneri,* Hook., are much longer, more slender, and branched as in *Jg. bicuspidata*; the leaves are smaller and *more complicate,* and there are *no stipules.*

39. *J. reclusa,* Tayl.! in Annals of Nat. Hist. xii. p. 89; H. P. 41.

Hab. Z_2 in truncis putridis. P. occ. *Pic de Ger.* P. c. *V. de Castelloubon.*

I consider this quite distinct from *Jg. bicuspidata* (with which Dr. Gottsche unites it as var. *ericetorum*), and in some respects more nearly allied to *Jg. connivens.* In 1846 Mr. Jenner showed me magnificent patches of it, growing with *Jg. connivens,* &c., on sand-rocks in Eridge Park, Tunbridge Wells.

40. *J. bicuspidata,* L.; Hook. Br. Jung. t. 11; Syn. Hep. p. 138; H. P. 42.

Hab. Z_{0-4} ubique.

41. *J. connivens,* Dicks. Cr. fasc. 4. p. 19; Syn. Hep. p. 141.

Hab. Z_2 P. c. loco *Hourquette d'Aspin,* lignicola. Semel visa!

42. *J. curvifolia,* Dicks.; Hook. Br. Jung. t. 16; Syn. Hep. p. 142; H. P. 43.

Hab. Z_2 in truncis putridis, frequens.

§ 5. ÆQUIFOLIÆ, N. ab E.

43. *J. setacea,* Web.; Hook. Br. Jung. t. 8; Syn. Hep. p. 144; H. P. 44.

Hab. Z_{2-3} supra ligna putrida, rarior. *Val de Jéret. Mt. Crabioules.*

44. *J. trichophylla,* L.; Hook. Br. Jung. t. 7; Syn. Hep. p. 145; H. P. 45.

Hab. Z_{2-4} ad saxa, truncos putridos, inter muscos, &c., vulgata.

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45. *J. julacea,* Lightf.; Hook. Br. Jung. t. 2; Syn. Hep. p. 146; H. P. 46.

Hab. Z_{4-5} in rupibus humidis. P. c. *Mt. Crabioules; Lac Lehou.* P. or. "in convalle *Eynes*" (Montagne, *l. c.*).

8. *Sphagnoecetis,* N. ab E.

46. *S. communis,* N. ab E.; Syn. Hep. p. 148; H. P. 47. *Jung. Sphagni,* Dicks.; Hook. Br. Jung. t. 33.

Hab. $Z_{0-1\ inf.}$ ad arborum excisarum truncos cariosos in imis Pyrenæis. "*Dax,* in paludibus spongiosis turfosisque inter Sphagnum palustre" (Grateloup, *l. c.*).

9. *Liochlæna,* N. ab E.

47. *L. lanceolata,* L. (sub *Jung.*); Hook. Br. Jung. t. 18; Syn. Hep. p. 150; H. P. 48.

Hab. Z_{0-2} secus rivulos Pyrenæorum, lignicola, rarius terrestris rupestrisve, frequens; necnon in Agro Syrtico loco *St. Pandelon de Dax.* "In collibus umbrosis et ad rupes cretaceas *Tercis*; necnon rupibus ophiticis *St. Pandelon* prope *Dax*" (Grateloup, *l. c.*).

10. *Lophocolea,* N. ab E.

Obs. The species of this genus may all be considered rare in the Pyrenees. *L. bidentata* I did not once observe in the higher mountains, though it occurred at the foot of the low hills near *Pau,* intermixed with mosses; yet I can hardly persuade myself that it does not ascend higher, and that, being reputed so common a plant, I may have passed it by unnoticed. *L. heterophylla,* another species equally frequent with us, I gathered but once in the Pyrenees.

48. *L. minor,* N. ab E.; Syn. Hep. p. 160; H. P. 49.

Hab. Z_1 P. c. in aggeribus circa *B.-de-Bigorre* (♂) et in valle *d'Aure* dicta.

49. *L. bidentata,* L. Sp. Pl. p. 1598 (sub *Jung.*); Hook. Br. Jung. t. 30.

Hab. $Z_{0-1\ inf.}$ P. occ. et c. circa *Pau* et *Dax.* In montibus nusquam vidi!

50. *L. heterophylla,* Schrad. (sub *Jung.*); Hook. Br. Jung. t. 31; Syn. Hep. p. 164; H. P. 50.

Hab. Z_2 P. c. *Cascade du Cœur* supra ligna putrida: e rarioribus.

11. *Harpanthus,* N. ab E. (caractere extenso).

51. *H. scutatus,* Web. et Mohr, Taschenb. p. 408 (sub *Jung.*). *J. stipulacea,* Hook. Br. Jung. t. 41.

Hab. Z_2 P. c. in monte *Crabioules* ad truncos putridos, sociis *Scapania apiculata, Jg. Schraderi,* &c.

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The fructification of this plant is *truly lateral* (ramulo fertili e ventre caulis exeunte), and not as described in 'Synopsis Hepaticarum,' p. 101, "perianthio terminali, mox dorsali," for an instance of which I have in vain searched perhaps a hundred fertile stems. *The involucral leaves are normally two, with an interposed stipule,* and the uppermost leaf is concrete with the perianth for one-third of its length. *The perianth is very thick below* (= 3–4 cellules), and should perhaps be rather regarded in this part as *a hollowing out of the apex of the stem. The calyptra is concrete with the inner surface of the perianth for more than half its length,* as correctly represented in Hooker's figure, but not alluded to in 'Synopsis Hepaticarum.' All these characters bring this species very close to *Harpanthus Flotovianus,* N. ab E. (Syn. Hep. p. 170), the sole tangible difference being that in the former the perianth is obovate and in the latter fusiform, while they separate it widely from *Jung. acuta* and *Bantriensis.* If we consult now the organs of vegetation, we find the similarity quite as striking. The leaves of *H. Flotovianus* are *bidentate* in the same manner, only with a shallower sinus; the stipules are proportionally narrower, but *equally acuminate,* falcate and slightly *twisted,* and *toothed on each side at the base* just as in the other. With so many points of agreement, and with the same general habit (*H. scutatus* being only a smaller plant), I do not hesitate to place these two species in the same genus, which will still remain equally well distinguished from *Jungermannia* on the one side and from *Chiloscyphus* and *Lophocolea* on the other.

12. *Chiloscyphus,* N. ab E.

52. *Ch. pallescens,* Schrad. Cr. Gew. 2. p. 7 (sub *Jung.*); Syn. Hep. p. 187.

Hab. Z_1 P. c. ad terram in monte *Lhieris.*

53. *Ch. polyanthos,* L. Sp. Pl. p. 1597 (sub *Jung.*); Syn. Hep. p. 188.

Hab. Z_8 P. c. ad rivuli ripas in monte *Crabioules.*

Var. *β. rivularis,* Lindenb. Hep. Eur. p. 30; H. P. 51.—*Hab.* Z_1 in fontibus profundis secus ripas flum. *Adour,* socio *Jg. cordifolia* (n. 24).

Subtribus 3. Geocalyceæ, N. ab E.

13. *Saccogyna,* Dumortier.

54. *S. viticulosa,* L. Sp. Pl. p. 1597 (sub *Jung.*); Hook. Br. Jung. t. 60; Syn. Hep. p. 194; H. P. 52.

Hab. Z_0 P. occ. in rupibus ophiticis *Sti. Pandelon* prope Aquas Tarbellicas. "Les rochers crayeux de *Tercis,* de *Rivière*; les forêts de *St. Vincent,* de *St. Paul,* de *Narrosse*; les côteaux de *St. Pandelon*" (Grateloup, *l. c.*).

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Subtribus 4. TRICHOMANOIDEÆ, N. ab E.

14. *Calypogeia,* Raddi.

55. *C. Trichomanis,* L. Sp. Pl. p. 1579 (sub *Mnio*). *Jung. Trichomanis,* Dicks.; Hook. Br. Jung. t. 79. *Calypogeia Trichomanis,* Corda; Syn. Hep. p. 198; H. P. 53.
Hab. Z_{0-2} ubique: fructifera in sylvis prope *Jurançon.*

15. *Lepidozia,* N. ab E.

56. *L. reptans,* L. Sp. Pl. p. 1599 (sub *Jung.*); Syn. Hep. p. 205; H. P. 54. *Jg. reptans,* Hook. Br. Jung. t. 65.
Hab. Z_{0-2} supra ligna putrida, vulgaris.

16. *Mastigobryum,* N. ab E.

57. *M. deflexum,* N. ab E.; Syn. Hep. p. 231; H. P. 55.
Hab. Z_{2-3} in sylvis editioribus, haud rarum. *Mte. Verte; V. de Castelloubon*; &c. *Lac Lehou* (Philippe!).

58. *M. trilobatum,* L. Sp. Pl. p. 1599 (sub *Jung.*); Syn. Hep. p. 230; H. P. 56. *Jg. trilobata,* Hook. Br. Jung. t. 76.
Hab. Z_{0-1} P. occ. in arborum excisarum truncis cariosis *Sti. Pandelon* prope Aquas Tarbellicas; locis similibus *Sti. Sever* invenit cl. Dufour! P. c. *Gorge de Labassère* (Philippe!).

Subtribus 5. PTILIDIEÆ, N. ab E.

17. *Trichocolea,* Dumortier.

59. *T. Tomentella,* Ehrh. (sub *Jung.*); Syn. Hep. p. 237; H. P. 57. *Jg. Tomentella,* Hook. Br. Jung. t. 36.
Hab. Z_{0-2} locis humidis, frequens. "In umbrosis humidiusculis, in collibus et ad arb. truncos prope *Dax*" (Grateloup, *l. c.*).

Subtribus 6. PLATYPHYLLÆ, N. ab E.

18. *Radula,* N. ab E.

60. *R. complanata,* L.; Hook. Br. Jung. t. 81 (sub *Jung.*); Syn. Hep. p. 257; H. P. 58.
Hab. Z_{0-2} ad truncos et rupes.

19. *Madotheca,* Dumortier.

61. *M. lævigata,* Schrad.; Hook. Br. Jung. t. 35 (sub *Jung.*); Syn. Hep. p. 276; H. P. 59.
Hab. Z_{0-2} in rupibus: semper sterilem inveni.

62. *M. platyphylla,* L.; Hook. Br. Jung. t. 40 (sub *Jung.*); Syn. Hep. p. 278; H. P. 60. *M. platyphylloidea,* N. ab E.; Syn. Hep. p. 280. *M. navicularis,* N. ab E.? Syn. Hep. p. 277?
Hab. Z_{0-2} in rupibus arboribusque, vulgatissima.

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Subtribus 7. JUBULEÆ, N. ab E.

20. *Lejeunia*, N. ab E.

Obs. The only species of this genus which attains the alpine region is *L. serpyllifolia*, but it is always unfertile there. *L. ovata* finds in the Pyrenees its only continental station, and but the second known, the first being the south-west corner of Ireland, around Bantry and Killarney. *L. calcarea* is confined to the rock indicated by its name*.

63. *L. serpyllifolia*, Dicks. Crypt. fasc. 4. p. 19 (sub *Jung.*); Syn. Hep. p. 374; H. P. 61.

Hab. Z_{0-3} in rupibus, arboribus imis, supra muscos, &c., frequens.

64. *L. ovata*, Tayl.! mst.; Syn. Hep. p. 376; H. P. 62.

Hab. Z_1 P. occ. inter muscos in rupibus subhumidis faucis *Gorge de Cauterets* dict. repens.

I have sedulously compared this with specimens of *L. ovata* gathered in company with Dr. Taylor at Cromaglown, one of his original stations, and cannot detect the slightest difference. It is a rather larger plant than *L. hamatifolia*, Hook., from which it differs essentially as follows: the leaves are *more lurid and opaque* (more chlorophyllose) and *never serrated*, as they are most frequently in the other; the larger lobe is *oblique, trapezoideo-ovate*, with the *margins convex* nearly to the apex (while in the ovato-acuminate leaves of *L. hamatifolia* the margins of the larger lobe are *concave* above the junction with the involute lobe); the involute lobe is smaller, and has not a projecting tooth near the apex as in *L. hamatifolia*.

65. *L. calcarea*, Libert; Syn. Hep. p. 344; H. P. 63. *Jg. hamatifolia β. echinata*, Hook. Br. Jung. t. Suppl. 3.

Hab. Z_2 P. occ. ad saxa calcarea in regione media montis *Pic de Ger*, ut et in valle *Combascou*.

* I did not observe *Lejeunia minutissima* in the Pyrenees, but it will not be out of place to mention here that I had lately the opportunity of examining Sir J. E. Smith's original specimens of this species, gathered in the New Forest by C. Lyell, Esq. in 1806, and figured on plate 1633 of Eng. Bot., and that they agree *as to the presence of stipules and every other essential character* with Hooker's figure in 'Brit. Jungermanniæ,' t. 52. Dr. Taylor was therefore in error (as I have always suspected) in maintaining Sir J. E. Smith's plant to be the *exstipulaceous* species; but as my distinguished and lamented friend was the first to clearly distinguish the latter, I propose that it shall bear his name, and the amended synonymy will stand thus:

Lejeunia minutissima, Smith! in Eng. Bot. t. 1633 (sub *Jung.*); Hook. Br. Jung. t. 52. *Jungermannia ulicina*, Tayl.! in Trans. of Edinb. Bot. Soc. 1841, i. p. 115. *Lejeunia ulicina*, Syn. Hep. p. 387.

Lejeunia Taylori, Spruce. *Jungermannia minutissima*, Tayl.! *l. c.* (non Smith). *Lejeunia minutissima*, Syn. Hep. *l. c.*

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21. *Frullania,* Raddi.

66. *F. dilatata,* L. Sp. Pl. p. 1600 (sub *Jung.*); Syn. Hep. p. 415; Hook. Br. Jung. t. 5; M. P. 64.
Hab. Z_{0-3} in arborum cortice.

67. *F. fragilifolia,* Tayl.! in Annals of Nat. Hist. xii. p. 172; Syn. Hep. p. 437; H. P. 65.
Hab. Z_1 P. occ. in arboris unicæ trunco prope pagum *Gélos.*

68. *F. Tamarisci,* L.; Hook. Br. Jung. t. 6 (sub *Jung.*); Syn. Hep. p. 438; H. P. 66.
Hab. Z_{0-3} fere ubique, arborea et saxatilis.

Hemicyclum 2. *Frondosæ.*

Subtribus 1. Codonieæ, Dumortier.

22. *Fossombronia,* Raddi.

69. *F. pusilla,* L.; Hook. Br. Jung. t. 69 (sub *Jung.*); Syn. Hep. p. 468; H. P. 67.
Hab. Z_{0-1} in fossarum parietibus, haud vulgata. *St. Sever. Dax* (Grateloup). *B.-de-Bigorre.*

Subtribus 2. Haplolæneæ, N. ab E.

23. *Pellia,* Raddi.

70. *P. epiphylla,* L.; Hook. Br. Jung. t. 47 (sub *Jung.*); Syn. Hep. p. 488.
Hab. Z_{0-1} in fossarum marginibus.

71. *P. calycina,* Tayl.! in Mackay, Fl. Hib. Pt. 2. p. 55 (sub *Jung.*); Syn. Hep. p. 490; H. P. 68.
Hab. Z_{0-1} P. occ. et c. in rivulorum ripis udis circa *Dax, Pau* et *B.-de-Bigorre.*

24. *Blasia,* Micheli.

72. *B. pusilla,* L. Sp. Pl. p. 1605; Syn. Hep. p. 491; H. P. 69. *Jg. Blasia,* Hook. Br. Jung. t. 82–84.
Hab. Z_{0-1} P. occ. in rupibus ophiticis *Sti. Pandelon* prope Aq. Tarbellicas. P. c. in humidiusculis montis *Superbagnères.*

Subtribus 3. Aneureæ, N. ab E.

25. *Aneura,* Dumortier.

73. *A. pinguis,* L. Sp. Pl. p. 1602 (sub *Jung.*); Syn. Hep. p. 493.
Hab. Z_0 "in paludibus ac ripis, fontibusque prope Aq. Tarbellicas" (Grateloup, *l. c.*).

74. *A. multifida,* L. Sp. Pl. p. 1602 (sub *Jung.*); Syn. Hep. p. 496.

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Hab. Z_0 "ad terram humidam prope fontes ac supra truncos putridos arborum, circa *Dax*" (Grateloup, *l. c.*).

75. *A. palmata,* Hedw. Theor. Gen. (sub *Jung.*); Ekart, Synops. Jung. t. 13. f. 115; Syn. Hep. p. 498; H. P. 70.
Hab. Z_{0-3} in truncis putridis. *Val de Jéret,* &c.

Subtribus 4. METZGERIEÆ, N. ab E.

26. *Metzgeria,* Raddi.

76. *M. furcata,* L.; Hook. Br. Jung. t. 55 et 56 (sub *Jung.*); Syn. Hep. p. 502; H. P. 71.
Hab. Z_{0-3} in saxis, arborum cortice, &c.

77. *M. pubescens,* Schrank; Hook. Br. Jung. t. 73 (sub *Jung.*); Syn. Hep. p. 504; H. P. 72.
Hab. Z_{0-3} in rupibus umbrosis montium frequens, planitiei rarior (*Dax*; Grateloup).

Tribus 2. MARCHANTIEÆ, N. ab E.

Subtribus 1. LUNULARIEÆ, N. ab E.

27. *Lunularia,* Micheli.

78. *L. vulgaris,* Micheli, Nov. Gen. Pl. p. 4. t. 4; Syn. Hep. p. 511; H. P. 73.
Hab. $Z_{0-1\ inf.}$ in imis muris, viarum umbrosarum lateribus, &c. Pyrenæorum humiliorum ut et Agri Syrtici, frequens.

Subtribus 2. JECORARIEÆ, N. ab E.

28. *Marchantia,* Linnæus.

79. *M. polymorpha,* L. Sp. Pl. p. 1603; Syn. Hep. p. 522.
Hab. Z_{0-1} locis exustis, &c., in planitie vulgatissime, in montibus rarius.

29. *Preissia,* N. ab E.

80. *P. commutata,* N. ab E. Europ. Leberm. 4. p. lxv. et 117; Syn. Hep. p. 539; H. P. 74. *Marchantia androgyna,* Tayl.! in Linn. Trans. 17. p. 380. t. 12. f. 1.
Hab. Z_2 in rupibus humidiusculis. *Mont Lizé*; *Labassère,* &c.

30. *Dumortiera,* Reinwardt.

81. *D. irrigua,* Wils. in Hook. Eng. Fl. v. P. 1. p. 106 (sub *Marchantia*); Syn. Hep. p. 543; H. P. 75. *Hygropyla irrigua,* Tayl.! in Linn. Trans. xvii. p. 390.
Hab. $Z_{1\ inf.}$ P. c. *B.-de-Bigorre,* ad ripas rivuli qui ad thermas dict. *de Salut* originem suam habet; sociis *Pellia calycina* et *Fegatella conica.*

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31. *Fegatella,* Raddi.

82. *F. conica,* L. Sp. Pl. p. 1604 (sub *Marchantia*); Syn. Hep. p. 546; H. P. 76.
Hab. Z_{0-1} locis humidis.

32. *Reboulia,* N. ab E.

83. *R. hemisphærica,* Raddi in Opusc. scient. di Bolon. ii. p. 357; Syn. Hep. p. 548.
Hab. Z_0 *Dax,* in humidiusculis ac umbrosis (Grateloup; R. S.).

33. *Fimbriaria,* N. ab E.

84. *F. fragrans,* Schleich. Cent. exsicc. 3. n. 64 (sub *Marchantia*); Syn. Hep. p. 558.
Hab. Z_0 "ad margines fontium et fossarum ac in rupibus umbrosis prope *Dax*" (Grateloup, *l. c.*).

Subtribus 3. Targionieæ, N. ab E.

34. *Targionia,* Micheli.

85. *T. Michelii,* Corda in Opitz Beitr. i. p. 649; Syn. Hep. p. 574. *Targionia hypophylla,* L. Sp. Pl. p. 1604.
Hab. Z_0 "circa *Dax*" (Grateloup, *l. c.*).

Tribus 3. Anthocéroteæ, N. ab E.

35. *Anthoceros,* Micheli.

86. *A. lævis,* L. Sp. Pl. p. 1606; Syn. Hep. p. 586.
Hab. Z_0 "ad terram, in locis umbrosis humidiusculis, prope Aq. Tarb." (Grateloup, *l. c.*).

87. *A. punctatus,* L. Sp. Pl. p. 1601; Syn. Hep. p. 583; H. P. 77.
Hab. Z_{0-1} locis humidis solo argilloso præcipue. *St. Pandelon. St. Sever. Loucrup* prope *B.-de-Bigorre.*

Tribus 4. Ricciæ, Lindenberg.

36. *Sphærocarpus,* Micheli.

88. *S. Michelii,* Bell.; Mont. in Ann. des Sc. nat. ix. p. 39; Syn. Hep. p. 595.
Hab. Z_0 circa *Dax.* "Elle croît sur la terre humide de quelques landes de *Marensin,* par l'ancienne route de *Bordeaux* à *Bayonne*" (Grateloup, *l. c.*).

37. *Riccia,* Micheli.

89. *R. glauca,* L.; Syn. Hep. p. 599.
Hab. Z_0 "supra terram argillaceam in locis umbrosis *Dax*" (Grateloup, *l. c.*); locis cultis *Sti. Sever.*

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90. *R. ciliata,* Hoffm.; Syn. Hep. p. 602.
Hab. Z_0 "ad terram madidam circa *Dax*" (Grateloup, *l. c.*).

91. *R. fluitans,* L.; Syn. Hep. p. 610.
Hab. Z_0 "in fontibus *Sti. Pandelon,* &c." (Grateloup, *l. c.*); *St. Sever* (Dufour !).

92. *R. natans,* L.; Syn. Hep. p. 606.
Hab. Z_0 "in aquis stagnantibus *Sti. Paul,* prope Aq. Tarbellicas" (Grateloup, *l. c.*).

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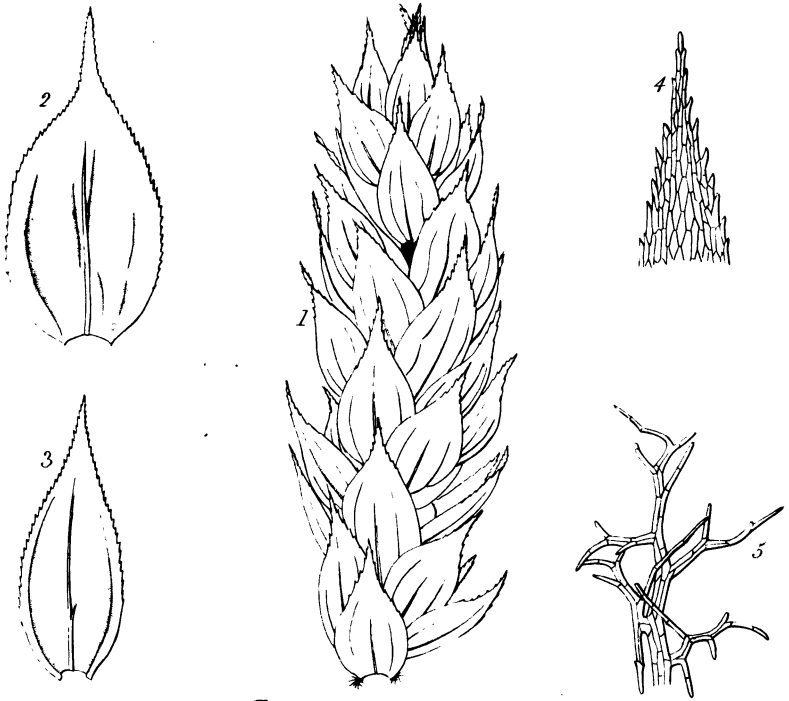

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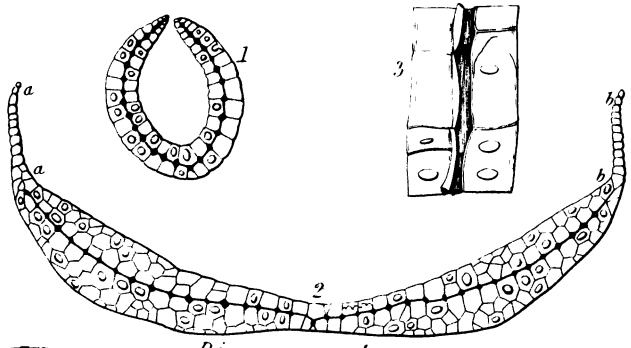

Dicranum glaucum.

Polytrichum alpinum.

R. Spruce del.

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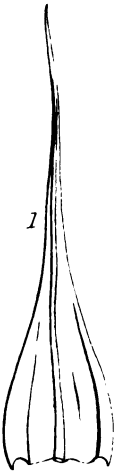

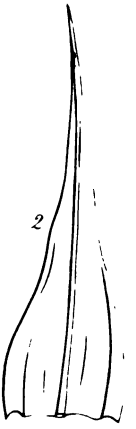

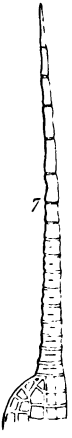

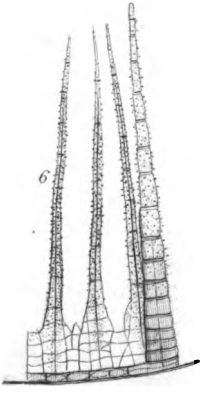

Isothecium Philippianum.

R. Spruce del.

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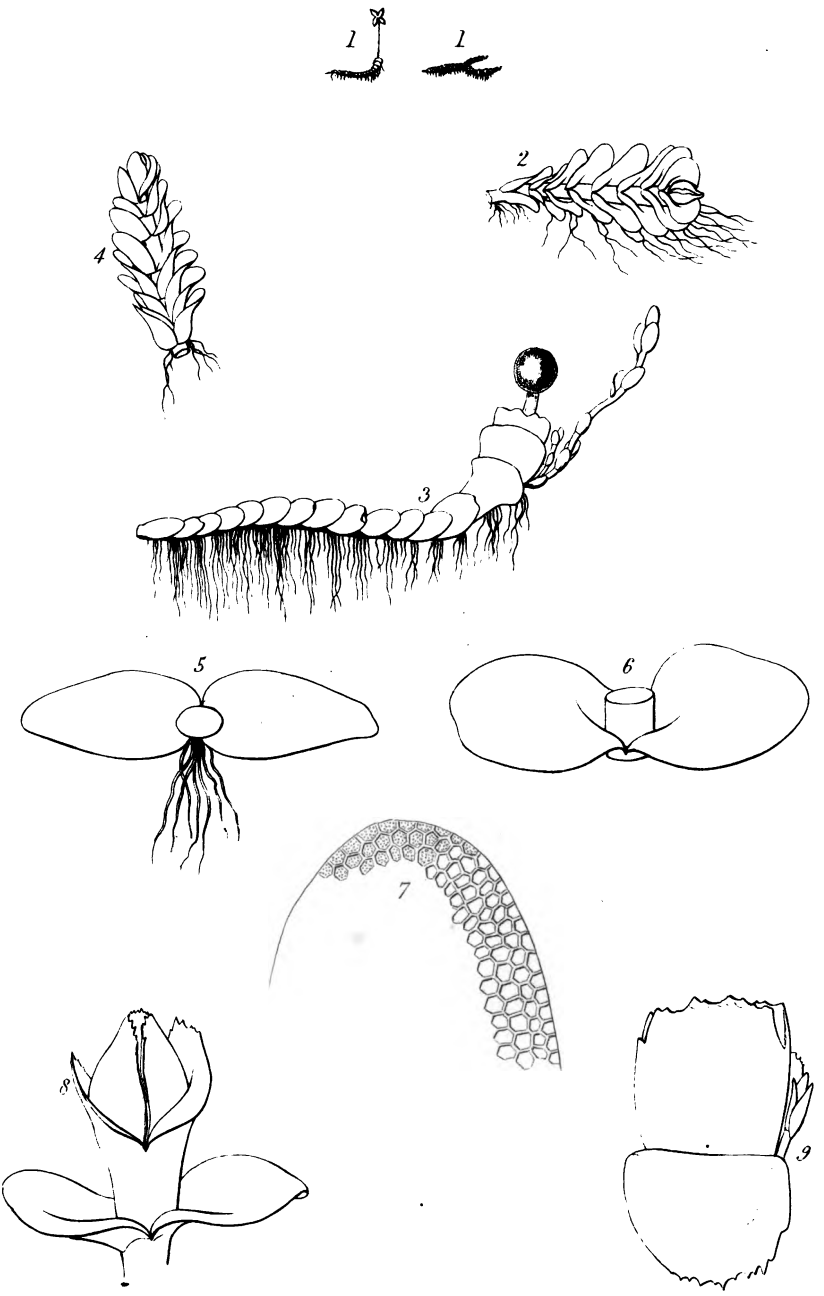

Southbya tophacea.

R. Spruce del.

J. De C. Sowerby sc.

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